The Canadian Medical Association Journal

Vol. 61 DECEMBER, 1949 No. 6

EFFECT OF ACTH AND CORTISONE UPON AN "ANAPHYLACTOID REACTION"

Hans Selye, M.D., Ph.D., D.Sc., F.R.S.C.

Institut de Médecine et de Chirurgie expérimentales, Université de Montréal, Montreal, Que.

A FEW years ago we observed that an extensive "anaphylactoid" œdema of the nose, tongue and paws can be elicited in rats by the parenteral administration of egg-white. We called the reaction "anaphylactoid" to emphasize its resemblance to true anaphylaxis, yet it is apparently not dependent upon a previous sensitizing exposure to an allergen, since rats appear to be naturally hypersensitive to egg-white, even though they have never been pretreated with it.[1]

Soon after the discovery of this reaction it was observed to be completely inhibited by an alarm-reaction elicited immediately preceding the administration of egg-white. A variety of stress-producing "alarming stimuli" (such as formaldehyde, muscular exercise, exposure to cold, etc.) were found to be effective in this respect.[1, 2, 3] It was assumed that, in all these experiments, the protective effect of the alarm-reaction was due to its ability to produce "non-specific resistance". It was noted that an individual exposed to stress becomes more resistant not only to the particular damaging agent with which the alarm-reaction was elicited, but also to entirely unrelated stimuli. Thus, for instance, an alarm-reaction produced by spinal-cord transection, forced muscular exercise or cold, was found to increase resistance against fatal effects from lung œdema (produced by toxic doses of adrenaline) or true anaphylaxis (produced by foreign proteins). Many other examples of this phenomenon have been given elsewhere.[2] Such manifestations of non-specific resistance are always accompanied by histologic signs of increased adrenocortical activity and never occur in adrenalectomized animals exposed to stress, hence, they had been tentatively ascribed to an increased production of corticoids during the alarm-reaction.[2, 4]

In the present communication we should like to report upon experiments which may help to elucidate the mechanism of this non-specific resistance, by furnishing further evidence of the important rôle played in their development by the corticoid hormones.

METHODS

The *experimental animals* used in this investigation were adult male Wistar albino or piebald rats. Before receiving the eliciting injection of egg-white, they were pretreated with various corticotrophic and corticoid preparations.

Corticotrophin (ACTH) was administered subcutaneously in the form of a solution containing 5 mgm. per c.c. of physiological saline. We used a highly purified preparation "Lot 60-61", supplied by Armour and Company of Chicago. This material has a biological potency of 100% Armour Standard La-I-A and contains 0.03 units of oxytocin and 0.06 units of vasopressin per mgm. It is contaminated only by negligible amounts of other known pituitary factors.

Lyophilized anterior pituitary (LAP) was injected subcutaneously in the form of a preparation containing 40 mgm. of lyophilized, cattle anterior pituitary powder, suspended in a 10% aqueous alcoholic solution.

Cortisone was given subcutaneously as a saline suspension of cortisone acetate microcrystals, each c.c. containing 25 mgm. The preparation was that distributed by Merck and Co. Inc., Rahway, N.J., in which suspending agents (to keep the microcrystals from settling) and 1.5% benzyl alcohol (as a preservative) are added.

Desoxycorticosterone (DCA) was administered subcutaneously as a microcrystal-suspension containing 50 mgm. per c.c. of corn oil, or in the form of pellets weighing 25 mgm. each, as furnished by the Schering Corporation of Bloomfield, N.J.

EXPERIMENTAL

Effect of DCA and cortisone upon the anaphylactoid reaction to egg-white.—Our first experiment was designed to examine the effect of DCA and cortisone (both in themselves and in combination with each other) on the development of the anaphylactoid response to egg-white. For this purpose we used 40 male piebald rats weighing 120 to 150 gm. All animals were bilaterally adrenalectomized on the first day of the experiment in order to eliminate any complicating endogenous corticoid formation. Then they were subdivided into four groups of ten rats each. Group I: no hormone treatment; group II: DCA; group III: DCA and cortisone; group IV: cortisone.

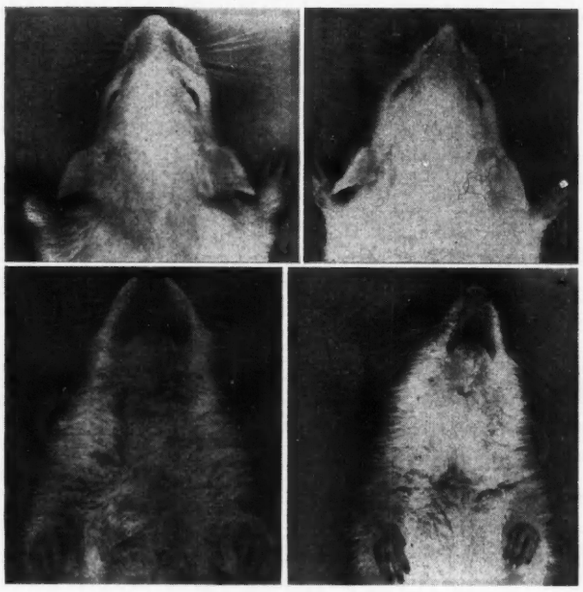
DCA was administered in the form of two 25 mgm. pellets subcutaneously on the day of adrenalectomy. Cortisone was given in two 2.5 mgm. injections daily subcutaneously.

All animals received 1% NaCl as drinking fluid in order to help their survival after adrenalectomy and also because a sodium supplement is known to aggravate DCA intoxication.

On the fourth day after adrenalectomy, 2 c.c. of egg-white was administered intraperitoneally to all animals in the four groups mentioned above. One hour after this, marked cyanotic hyperæmia and œdema developed around the face, tongue, and paws in the rats of groups I and II, that is, those receiving no hormone treatment and those given DCA. In the animals of groups III and IV which received cortisone, with and without DCA respectively, this anaphylactoid response was either absent or extremely mild.

By the third hour after the administration of egg-white, the animals given no hormone treatment had died, after having developed a condition of pronounced hypothermia and shock. All other animals survived, and those in the two groups receiving cortisone were actually in excellent clinical condition. The rats in group II (DCA) showed an even slightly more pronounced anaphylactoid reaction than those in group I, although still surviving. Those in groups III (DCA and cortisone) and IV (cortisone) still showed almost no response but the difference between the latter two groups was not sufficiently obvious to permit any definite conclusion.

Effect of ACTH upon the anaphylactoid reaction to egg-white.—Having thus learned that cortisone inhibits, while DCA tends to aggravate the anaphylactoid reaction to egg-white, we wanted to determine whether ACTH would act like cortisone, because in many other respects, these two hormones exhibit essentially similar properties. For this purpose, twelve male Wistar albino rats, weighing 120 to 180 gm., were subdivided into two groups of six animals each. Group I received no hormone treatment; in group II each animal was given 2.5 mgm., and two hours later an additional 2 mgm., of ACTH subcutaneously. One hour after this second hormone injection, all animals of both groups received 2 c.c. of egg-white intraperitoneally. Three hours later, all the control animals had developed marked anaphylactoid reactions, while only two of the ACTH treated showed a barely noticeable response (see Figs. 1 to 4).



Figs. 1 and 2.—Head and paws of an unpretreated rat injected with egg-white. Note marked œdema and hyperæmia of the paws, lips and nose. **Figs. 3 and 4.**—Corresponding photographs of a rat having received ACTH prior to treatment with egg-white. Note the absence of the anaphylactoid response.

Comparative study of the effect of LAP and ACTH upon the anaphylactoid reaction to egg-white.—In the last experiment of this series, we wanted to study the effect of our two anterior pituitary preparations under comparable experimental conditions. For this purpose, 18 male piebald rats weighing 120 to 150 gm. were subdivided into three groups of six animals

each. Group I received no hormone preparation; group II were given 40 mgm. of LAP daily, divided into five doses; group III received 10 mgm. of ACTH daily, also divided into five doses. On the 5th day of this treatment, all animals were injected intraperitoneally with 2 c.c. of egg-white. The anaphylactoid response became most rapidly obvious in group III (LAP), and a few minutes later, in the untreated controls of group I. The difference in the intensity of the response was not very marked, yet, it appeared to be definitely more pronounced in the LAP-treated than in the untreated controls. By contrast, only two animals pretreated with ACTH showed a transitory slight reaction, which had disappeared almost completely in four hours. By that time the untreated controls of group I, and especially the LAP-treated animals of group III, still exhibited very pronounced œdema of the paws and face.

DISCUSSION

The above mentioned experiments clearly indicate that both ACTH and cortisone are highly effective in inhibiting the anaphylactoid response to egg-white in rats. It is interesting in this connection that antihistaminics exert a similar inhibitory effect upon this reaction.[3, 5] The question arises whether antihistaminics could not also be used in the therapy of those clinical conditions which are known to be beneficially influenced by ACTH or cortisone (*e.g.*, rheumatic fever, rheumatoid arthritis, lupus erythematosus).

It is less obvious from the present experiments that DCA and LAP exert an effect opposite to that of cortisone or ACTH. However, a few years ago we noted that arthritic and other "rheumatic" changes tend to develop in rats chronically treated with DCA; such lesions tend to be particularly severe in animals whose suprarenals had previously been removed. These findings have recently been confirmed by others on extensive experimental material.[6] It has also been shown that Addisonian patients may develop "rheumatic-like" joint swellings under the influence of DCA overdosage[7 to 10] and Addisonians are notoriously hypersensitive to overdosage with DCA. Furthermore, several actions of mineralo-corticoids (such as DCA) are inhibited by gluco-corticoids (such as cortisone).[11] Hence, it was assumed that adrenalectomy sensitizes to the toxic effects of DCA because it removes the source of endogenous gluco-corticoids and thereby predisposes to the development of a particularly unfavourable gluco-corticoid/mineralo-corticoid balance.[2, 4]

Many other observations could be quoted in support of this assumption, but it will suffice to mention a few of them here. Chronic pretreatment with DCA tends to cause thymus hypertrophy,[12, 13] while gluco-corticoids exert an opposite effect.[4] DCA-pretreated rats respond to various alarming stimuli with hypoglycæmia instead of the usual hyperglycæmia characteristic of exposure to stress;[13a] conversely, adrenal cortical extracts (rich in gluco-corticoids) increase the hyperglycæmic response during the alarm-reaction.[14] The development of shock after extensive trauma is aggravated by DCA-pretreatment and mitigated by corticosterone (another gluco-corticoid compound[15]). Quite recently, it has been shown that even the hypertension, elicited in sensitive patients by DCA-overdosage, is abolished by an adrenal extract rich in gluco-corticoids.[16] Perhaps DCA given in toxic doses creates a condition of "partial hypocorticoidism", that is, a state in which manifestations of hypo-gluco-corticoidism, are combined with hyper-mineralo-corticoidism.[2, 17] Since DCA is a close chemical relative of cortisone, it may block the "target organs" so that the latter cannot act upon them. This "blocking" might be due to some mechanism of "competition for the substrate", such as has been demonstrated to exist between adrenaline and certain adrenaline derivatives or vitamins and their corresponding anti-vitamins.

It is especially difficult to understand why LAP, an impure anterior pituitary preparation, acts like DCA, while purified ACTH exerts cortisone-like effects. LAP contains ACTH and, under the conditions of our experiment, it produced an equally pronounced adrenal cortical enlargement; hence, we must consider the possibility that the pituitary contains additional principles which antagonize the ACTH effect or so modify it that a DCA-like action results. This may be important in the pathogenesis of what we called the "disease of adaptation". It will be recalled that under certain conditions, chronic exposure to stress (*e.g.*, infections, intoxications, cold, parenteral protein administration) causes nephrosclerosis, myocarditis, hypertension as well as arteriosclerotic and "rheumatic" changes similar to those produced by DCA or LAP.

In this connection it is interesting that the so-called "formalin-arthritis" (produced in rats by injecting a dilute formaldehyde solution into the vicinity of joints) is also slightly aggravated by pretreatment with DCA or LAP and almost completely inhibited by cortisone or ACTH. Thus here again there appears to exist an antagonistic relationship between DCA or crude anterior pituitary preparations, on the one hand, and cortisone or purified ACTH on the other.[17]

At the time of our first observations in 1944, the assumption of a pathogenetic relationship between the adrenal cortex and the allergic rheumatoid and other collagen diseases, appeared rather far fetched. However, this view received strong support from recent clinical observations showing that adrenal cortical extracts,[18] which are notoriously rich in gluco-corticoids, and especially cortisone,[19] a typical gluco-corticoid compound, produce spectacularly beneficial effects in patients with chronic rheumatoid arthritis. Purified ACTH likewise proved effective in rheumatoid arthritis, as well as in acute rheumatic fever, and allied collagen diseases such as lupus erythematosus.[19, 20]

Various points of view have been expressed concerning the probable relationship between the experimental production of rheumatic and rheumatoid changes with mineralo-corticoids or pituitary extracts on the one hand and their prevention with gluco-corticoids and ACTH on the other.[6, 21, 22] It is remarkable that the lesions particularly amenable to cortisone or ACTH treatment have empirically been found to respond well to the so-called "non-specific therapy", "fever therapy" and "shock therapy". Such drastic measures stimulate defence by eliciting a general-adaptation-syndrome and, more particularly, an increased production of ACTH and gluco-corticoids.[2, 4]

We feel in agreement with the concept of the "diseases of adaptation", first outlined in this Journal,[23] that a number of maladies (*e.g.*, rheumatic and rheumatoid conditions, allergic and anaphylactic phenomena, certain hypertensive diseases, nephrosclerosis) may largely depend upon a derangement of the pituitary-adrenocortical response to stress, a derangement in which the pattern of corticoid secretion is abnormal. The present communication presents a few additional observations illustrating the possible clinical implications of this concept upon the therapy of these "diseases of adaptation".

SUMMARY

Cortisone (a gluco-corticoid compound) and purified ACTH inhibit the anaphylactoid reaction of the rat to the parenteral administration of egg-white. Desoxycorticosterone acetate (a mineralo-corticoid compound) and a highly corticotrophic impure anterior pituitary preparation failed to inhibit, and indeed tended to aggravate this reaction.

These observations are discussed in connection with the probable participation of the adrenal-cortex in the pathogenesis of the allergic and other so-called collagen diseases.

This investigation was performed with the aid of a grant from the Canadian National Research Council. The author is also indebted to the following companies who supplied the hormone preparations necessary for this work: Merck and Co. Rahway, N.J. (cortisone acetate), Armour and Company, Chicago (ACTH), Schering Corporation, Bloomfield, N.J. (desoxycorticosterone acetate) and F. W. Horner and Co. (lyophilized anterior-pituitary tissue). Special thanks are due to Mr. Kai Nielsen for the photographs and to Mr. Bernard Messier for technical aid.

REFERENCES

1. SELYE, H.: *Endocrinology*, **21**: 169, 1937.
2. *Idem.*: Stress, Acta Endocrinologica, Inc. Publ., Montreal (in press).
3. LEGER, J. AND MASSON, G.: *Ann. Allergy*, **6**: 131, 1948.
4. SELYE, H.: *J. Clin. Endocrinology*, **6**: 117, 1946.
5. CLARK, W. G. AND MACKAY, E. M.: *Proc. Soc. Exper. Biol. & Med.*, **71**: 86, 1949.
6. PIROZYNSKI, W. AND AKERT, K.: Schweiz. med. *Wchnschr.*, **79**: 745, 1949.
7. DE GENNES, L.: *Presse méd.*, **55**: 437, 1947.
8. DE GENNES, L., MAHOUDEAU, D. AND BRICAIRE, H.: *Bull. et mém. Soc. méd. d. hôp. de Paris*, **63**: 532, 1947.
9. LAROCHE, G.: *Presse méd.*, **55**: 481, 1947.
10. *Idem*: *Bull. et mém. Soc. méd. d. hôp. de Paris*, **63**: 616, 1947.
11. SELYE, H.: Textbook of Endocrinology, 2nd ed., Acta Endocrinologica Inc., Publ., Montreal, 1949.
12. *Idem*: *J. Anat.*, **76**: 94, 1941.
13. SELYE, H. AND BELAND, E.: *Rev. Canad. de Biol.*, **2**: 271, 1943.

13a. SELYE, H. AND DOSNE, C.: *Endocrinology*, **30**: 581, 1942.

14. *Idem*: *Proc. Soc. Exper. Biol. & Med.*, **48**: 532, 1941.
15. SELYE, H., DOSNE, C., BASSET, L. AND WITTAKER, J.: *Canad. M. A. J.*, **43**: 1, 1940.
16. PERERA, G. A. AND PINES, K. L.: *Proc. Soc. Exper. Biol. & Med.*, **71**: 443, 1949.
17. SELYE, H.: *Brit. M. J.* (In press).
18. BASSI, M. AND BASSI, G.: *Endocrinol. e. sc. costit.*, **18**: 189, 1946.
19. HENCH, P. S., KENDALL, E. C., SLOCUMB, C. H. AND POLLEY, H. F.: *Proc. Staff Conf. Mayo Clin.*, **24**: 181, 1949.
20. THORN, C. W., BAYLES, T. B., MASSEL, B. F., FORSHAM, P. H., HILL, S. R. JR., SMITH, S. III AND WARREN, J. E.: *New England J. Med.*, **241**: 529, 1949.
21. Editorial: *Brit. M. J.*, May 7, 812, 1949.
22. Editorial: *New England J. Med.*, **241**: 545, 1949.
23. SELYE, H.: *Canad. M. A. J.*, **50**: 426, 1944.

Genius is not a single power, but a combination of great powers. It reasons, but it is not reasoning; it judges, but it is not judgment; imagines, but it is not imagination; it feels deeply and fiercely, but it is not passion. It is neither, because it is all.—Whipple.

AN EXTENSIVE OUTBREAK OF STAPHYLOCOCCAL INFECTIONS IN MATERNITY UNITS

(The Use of Bacteriophage Typing in Investigation and Control)

J. C. Colbeck, M.B., B.S., M.R.C.S., L.R.C.P.*

Vancouver, B.C.

IT is the impression of many obstetricians in England that outbreaks of breast abscesses in mothers and staphylococcal skin infections in the newborn have become more frequent in recent years. Knott and Blaikley[1] make this statement but give no figures to support their view, and indeed it is difficult to obtain accurate statistical information. Hobbs[2] makes a similar statement. Staphylococcal outbreaks are usually found to be more difficult to control than streptococcal puerperal outbreaks. The lack of definite knowledge concerning the method of spread of staphylococcal outbreaks contributes greatly to this failure, while the inability of the pathologist to differentiate all virulent from relatively avirulent staphylococci from carriers is another fundamental factor. Moreover, the usual absence of maternal deaths allows hospital authorities to temporize and take much less active steps for control than they would dare in the case of streptococcal puerperal sepsis.

During the fall of 1947 there was a sudden increase in the number of cases of breast abscesses in the maternity unit of a general hospital "B" in the city of Winnipeg.† This unit delivers approximately 2,000 women per annum and until September, 1947, the incidence of breast abscesses was probably in the region of one per four hundred cases delivered. The sudden increase was associated with an outbreak of pustular skin lesions in the babies. Shortly afterwards similar outbreaks began in the maternity units of two other general hospitals "C" and "D". Other small hospitals in the area were also affected but the systematic examination was limited to the four larger hospitals. The incidence of breast abscesses waxed and waned for unexplained reasons from month to month and at times as many as 10 to 15% of women delivered developed breast abscesses. It bore no relationship to climatic conditions, which vary from temperatures of 90° F. in summer to minus 40° F. in winter.

Until the spring of 1949 another large hospital in the city—hospital "A"—showed no unusual incidence of breast abscesses or pustules in children. It is perhaps significant that there is considerable overlapping of staff between hospitals "B", "C" and "D" and rather less with hospital "A". All attempts to control this outbreak, including careful review of techniques and temporary closing and cleaning of maternity units at hospital "B", met with little success and an intensive combined effort was therefore made to investigate the method of spread in order to obtain information to indicate a rational method of control.

During the course of the investigation, hospital "A" which had previously been free of infection, suffered an explosive outbreak in spite of the previous enforcement of every recognized method of control. The method by which the outbreak was finally controlled will form the subject of a later report.

Breast abscesses are practically always due to *Staph. aureus* but staphylococci producing golden pigment are not only frequent in the noses, throats and skins of healthy persons but can be isolated from air and have been found in dusting powders, lotions and other articles used in nurseries and maternity units. It is now generally agreed that most pathogenic staphylococci produce coagulase active against human, rabbit and horse plasma and that coagulase non-producers are unlikely to cause serious disease in man. Many of the strains of *Staph. aureus* isolated from noses and throats are coagulase negative, but even after these have been disregarded it is found that there is a high carrier rate of coagulase positive aureus staphylococci in a healthy community.

McFarlan[3] found 34% of healthy undergraduates to be nasal carriers of typical hæmolytic (α hæmolysin) coagulase positive staphylococci. Martin and Whitehead[4] investigating healthy adults found 40% to be nasal carriers of coagulase positive staphylococci: the examination of the skins, throats and salivæ gave additional carriers, giving a total carrier rate of 62%. Williams[5] obtained essentially similar results. Mathews, Atkinson, Sainsbury and Clegg[6] obtained coagulase positive staphylococci from 55.7% of the mouth washings of school children.

Since coagulase positive strains of staphylococci are so widespread in the general community in the absence of an outbreak of boils, it is apparent that the virulence for man of certain strains must be far greater than that of the strains commonly present. It is indeed unjustifiable to call all strains which produce coagulase and α hæmolysin "pathogenic staphylococci" as is now frequently done (*e.g.*, Gillespie and Simpson[7]). All that has been shown by the bacteriologist is that most pathogenic strains belong to this group, but the converse, *i.e.*, that all this group is pathogenic, is still unproved and epidemiological evidence is opposed to this view. The use of the term *Staph. pyogenes* for such organisms, though justified by priority, is also objectionable. It is better to continue the

* Director of Laboratory, Shaughnessy Hospital, Vancouver; previously Director of Laboratory Services to the Province of Manitoba.

† It must be noted that in the report by McGuinness and Musgrove[16] concerning certain aspects of this outbreak, the letters designating the various hospitals do not coincide with those used in this report.

use of the descriptive term *Staph. aureus*, reserving the name "pyogenes" for strains truly pathogenic for man when tests are available for their identification, just as the *Strep. hæmolyticus* Group A is now termed pyogenes. The probability that many coagulase positive strains have a very low virulence is of considerable practical importance, for if all so-called staphylococcus pyogenes are regarded as dangerous, all carriers should be prevented from working in maternity units and nurseries. Since the carrier rate of coagulase positive staphylococcus may be as high as 60%, it is not only a practical impossibility to find enough negative people to work the wards but also it is difficult to understand why many units remain free of outbreaks of breast abscesses.

The method of bacteriophage typing of staphylococci first described by Fisk[8] and extended and refined by Wilson and Atkinson[9] has been used in the investigation of a number of staphylococcal outbreaks in England. By means of specific bacteriophages it is possible to differentiate strains of *Staph. aureus* which appear identical by other laboratory tests and thus to trace the source and spread of infection.

METHODS

Swabs were requested from all cases of breast abscesses and the first strains of *Staph. aureus* isolated were tested for lysis with broth cultures of a series of phage carrying staphylococci. As the early breast abscess strains isolated reacted with a particular bacteriophage carrying culture, a pure phage filtrate was prepared according to the method of Wilson and Atkinson.[9] This consists of the repeated subculturing of the phage from single plaques, followed in our case by propagation on the surface of glucose agar plates. The lysed growth on the plates was finally washed off with glucose broth and filtered through a Seitz E.K. filter at pH 6.8. In this way phages of high titre were readily obtained. Various dilutions of the filtrate were spotted on plates spread with the propagating strain of staphylococcus and the highest dilution giving total lysis observed. The phage filtrate was then kept in a refrigerator without the addition of antiseptic. It was found to retain its titre without appreciable alteration for three months and no longer observation was made.

In testing the various strains of staphylococcus, four dilutions of the phage filtrate were chosen so that the two strongest concentrations gave total lysis with the propagating strain. In order to test a strain isolated from a breast abscess or carrier for reaction with this phage, which for lack of a better definition of the strain is referred to in this report as phage "W", a broth culture was made from a single colony and spread on a plate of glucose agar. Initially, difficulty was experienced in obtaining perfectly even confluent growths, although various forms of wire, metal and glass spreaders were tried. Finally, it was found that sterilized bent pipe cleaners gave the best results. Four drops of an eighteen hour culture in glucose broth of the organism to be tested were dropped on the surface of an agar plate which was then placed on a turntable: the pipe cleaner was then applied to the surface and the plate spun. When the surface of the plate was sufficiently dried, the drops of phage were applied with a fine capillary pipette. The plates were then incubated at 37° C. for four hours and left overnight at 24° C. By this means clear positive or negative results were obtained, with the vast majority of cultures. At the same time, filter paper discs impregnated with various antibiotics were placed on the plate to test drug sensitivities.

Results with breast abscesses.—As previously stated, a phage was isolated early in the investigation which reacted in high dilution with all the early strains from the affected hospitals. The results of the examination of cultures of *Staph. aureus* from 160 cases of breast abscesses from the Winnipeg area are shown in Table I.

TABLE I.

RESULTS OF BACTERIOPHAGE TYPING OF STAPHYLOCOCCAL CULTURES FROM 160 CASES OF BREAST ABSCESSES

	Period Sept. 1948 to Jan. 1949		*Period Feb. 1949 to May 1949*		
Phage results	*Hospital "A"*	*Hospitals "B" "C" and "D"*	*Hospital "A"*	*Hospitals "B" "C" and "D"*	*Totals*
Phage "W" positive	0	87 (97.8%)	23 (96%)	37 (86%)	147 (91.9%)
Phage "W" negative	4	2 (2.2%)	1 (4%)	6 (14%)	13 (8.1%)
Total examined	4	89	24	43	160

These figures must be examined critically, since the cases examined are only a sample of the breast abscesses which occurred and many were not typed. There was, however, no conscious selection, as a request was made for swabs from all cases of breast abscesses, and one is justified in regarding the proportion of phage "W" negative to phage "W" positive strains in this sample as indicative of the proportion in the whole series of breast abscesses in the various hospitals.

In Table I the results from the three hospitals initially affected have been added together and kept separate from those of hospital "A" which did not suffer from the epidemic until the Spring of 1949. During 1948 five breast abscesses occurred at hospital "A" among 1,624 women delivered, an incidence of 0.3%. Cultures from four of these cases were available for phage typing and none

of them was positive to phage "W". During the same period, 97.8% of 89 breast abscesses occurring in women delivered in hospitals "B", "C" and "D" reacted to titre with phage "W". In February, 1949, a specimen of pus from the breast abscess of a woman delivered in hospital "A" (on January 25th) was "W" positive. A second breast abscess specimen from hospital "A" received in March gave the same result and in April twelve breast abscess specimens from this hospital were "W" positive. As previously stated, the results reported in Table I are only a proportion of the breast abscesses which occurred. It is known that during March, April and May of 1949, 33 breast abscesses occurred following delivery in this hospital, compared with five during the whole year of 1948. Specimens from a much lower proportion of the breast abscesses were sent for typing from some of the other hospitals.

Pustules in infants.—As previously stated, there was at times a high incidence of staphylococcal skin infections in newborn babies in the affected hospitals. The incidence of these varied greatly between the various affected hospitals, and in a given hospital, from time to time. Many of the cases of pustules began during the first ten days of life, but others were delayed until the child had gone from hospital. At hospital "B" it was noticed that a rise in the incidence of pustules in children during their stay in hospital preceded a rise in breast abscesses occurring later in mothers. At hospital "C", however, the incidence of pustules was reduced to a very low level, apparently as a result of reduction in bathing and other alterations of technique, without any appreciable alteration in the incidence of breast abscesses. The trauma to the child's delicate skin and the added risk of infection resulting from bathing and anointing, appears to be an important factor even in the presence of a virulent infection. Some clinicians had the impression that the maternal breast abscesses were preceded by pustules in the children in the vast majority of cases. This impression is not substantiated by the information provided by doctors submitting specimens of pus from breast abscesses for examination. In an application form for the phage typing of breast specimens the question was asked "did the baby have pustules?" The majority of doctors did not provide an answer, but in the 53 cases in which an answer was given, the maternal breast abscess was preceded by pustules in the baby in 25 cases and not in 28 cases. Unfortunately, few specimens of pus from the pustules in hospitals "B", "C" and "D" were examined, but all 14 submitted were of the phage type "W". During 1948 there were very few pustules in the babies in hospital "A" but specimens from two cases did not react with phage "W". However, at the end of January, 1949, a swab from a child delivered in hospital "A" gave a "W" type staphylococcus. It is interesting that this child's mother was the first case of breast abscess due to this type found in hospital "A" and she developed the abscess approximately one month after the baby had pustules.

After the onset of the epidemic in hospital "A", 42 specimens were received from cases of pustules and 31 were "W" positive strain. The comparatively large number of strains of staphylococci which were not phage "W" in this series is probably due to the fact that even the slightest pimple appearing on a baby in hospital "A" was examined bacteriologically during this period. No series of cultures of pustules from babies in hospitals not affected by the outbreak was, of course, possible but in addition to the two negative cases from hospital "A" prior to the outbreak of the epidemic, specimens were received from a Polish immigrant baby which was taken off the train on arrival in Winnipeg suffering from severe widespread pustules and these were also "W" negative.

Other staphylococcal lesions in children.—Specimens were also examined from a number of major and minor infections in children from initially affected hospitals "B", "C" and "D" and later from hospital "A". A number of breast abscesses occurred in newborn infants delivered in affected hospitals and four were available for typing and were found to be "W" positive. (A breast abscess occurring in a girl of twelve who had not been in any way connected with the affected hospitals was "W" negative.) Four swabs of purulent conjunctivitis from the affected hospitals were also "W" positive. Otitis media occurred in a number of babies and two of three cases examined were "W" strain.

Material was available from ten cases of lung abscesses and all these were "W" posi-

tive. Histories of these children are interesting and are shown in Table II. It is known that other cases occurred, some of which were successfully treated with aureomycin. Case 8 is interesting in that pulmonary infection was not suspected before death and in view of a report by McLetchie[10] in which he records cases of staphylococcal pneumonia causing sudden death in babies, it is interesting to speculate how many children died of undiagnosed pulmonary infections during this outbreak.

TABLE II.

PULMONARY INFECTIONS IN BABIES—ALL OF WHICH WERE DUE TO TYPE "W" STAPHYLOCOCCUS AUREUS

CASE 1	Died at three weeks. Bottle fed from birth. Admitted to a children's hospital as a feeding problem and died four days later. Autopsy: The right lung and right lower lobe showed firm adhesions. The right upper lobe was consolidated and exuded pus on section. Left lower lobe consolidated.
CASE 2	Diagnosis "lung abscesses". Specimen of pleural fluid "W" positive.
CASE 3	Had pustules. Died when three weeks old. Autopsy showed "a type of lobar pneumonia".
CASE 4	Good health until seven weeks old, when cough and fever began. Admitted to children's hospital for treatment. Organisms from mucus obtained by suction, also pus from lung abscess. Both were "W" positive. X-ray showed at least one abscess—probably several—right lower lobe. Nose and throat "W" positive. Baby survived.
CASE 5	Admitted to a children's hospital when two and a half months old for incision of staphylococcal abscess on the chin and for pustules. Was discharged well, after four days. Readmitted later with diarrhœa and vomiting and died age four months. Autopsy showed consolidation of the lower lobes and both apices. Cultures from lungs showed the "W" type staphylococcus. This baby was breast fed for the first two weeks of life only.
CASE 6	Culture from pus from lung abscess. Baby had spontaneous pneumothorax, following "pneumonia".
CASE 7	Was breast fed for three days. Mother then developed a breast abscess and the baby was thereafter bottle fed. Baby had pustules on all parts of arms and trunk and on admission to hospital had an abscess below the nipple. It died with lung absesses aged four weeks. The mother also had boils in addition to her breast abscess. The baby's throat and pleural fluid showed staphylococci phage type "W".
CASE 8	Died when three weeks old. Pus from anterior thoracic retro-sternal abscess, in addition to pulmonary abscesses, "W" positive. Mother had breast abscess and abscesses on leg.
CASE 9	Breast feeding discontinued after first few days. Developed pustules in diaper region when ten days old. Ten days later developed deep abscess on head and abscess in axillary region. Mother had pustules on fingers of right hand and left arm where baby's head rested during bottle feeding. Baby died when one month old. Material taken at autopsy, pericardium "W" positive, lung and axillary swelling also "W" positive.
CASE 10	Baby died aged 10 days. Breast fed from birth. X-ray examination showed appearances of bronchopneumonia. Autopsy showed abscesses in lung and liver.

Lesions in hospital staff and contacts other than babies.—We were frequently informed of homes in which boils and pustules had arisen in husbands and older children of women after return home from the affected hospitals. These boils were often severe and recurred in the families over many months. Few of the lesions from home contacts were available for typing, but the histories of a number of family outbreaks which came to our notice are summarized in Table III.

TABLE III.

FAMILY INFECTIONS

FAMILY NO. 1	Baby developed pustules when 10 days old. Boils on head at 90 days. Mother had boils on hips. Father had boils on neck when baby four months old. Grandmother living with family also had boils on face and hands. The baby developed further pustules when 10 months old and the grandmother more boils on the face: swabbing this family gave the following results: Baby, pustule and nose "W" positive; Mother, throat and nose "W" positive; Father, throat "W" positive; Grandmother, boil and nose "W" positive.
FAMILY NO. 2	Nose swab from group submitted from dairy workers for hæmolytic streptococci. *Staph. aureus* was found and phage typed. Result, "W" positive. Interrogation of the family revealed that wife had a baby in one of the affected hospitals 18 months previously. A few weeks after leaving hospital, baby had pustules on abdomen. Some months later mother had abscess on hip which required medical treatment, and at ten months baby had abscess on thigh. Two or three weeks later father had boil on face. Father's nose swab "W" positive approximately 10 months after boil.
FAMILY NO. 3	Baby and elder sister had a few pustules. Mother developed boils six weeks after delivery. The mother's boils recurred during the following 15 months and her nose was then found to give a heavy growth of phage type "W" staphylococci.
FAMILY NO. 4	Baby developed pustules on seventh day of life. Mother had pustules and breast abscess four months later. When baby was 10 months old father developed furuncles and carbuncles over cheek and thigh, which recurred over a period of three weeks. Father's nose "W" positive.
FAMILY NO. 5	Baby developed pustules on return home from hospital. Father developed breast abscess for which he was hospitalized. No history of infection in mother.

FAMILY No. 6

Baby in perfect health until six months old when it developed abscesses on head. A man and woman who adopted this baby had abscesses on hands and arms. No previous history of boils in this couple.

FAMILY No. 7

Baby developed pustules at three weeks old. Mother had breast abscess. Father had abscess on right shoulder, which was treated by doctor at meat packing firm for which he worked. No swab was available from the abscess but father's nose was "W" positive one month later. Baby's nose and throat "W" positive 27th day of life.

FAMILY No. 8

Baby had pustules and the mother breast abscesses and paronychia shortly after delivery. The grandmother suffered recurrent boils on her labia later; a culture from one of these boils was phage type "W".

FAMILY No. 9

Baby suffered severe pustules after return from hospital. Father developed rectal abscess which was "W" positive.

FAMILY No. 10

Baby had paronychia on fingers and toes, pustules and abscess on scalp first few weeks of life. Father had large abscess right arm when baby 7½ months old. Mother had abscess of neck which was "W" positive when baby was 8 months old.

In hospital "B" boils occurred in members of the staff connected directly with the maternity unit. These were all found to belong to type "W". It is also reported that several clean operation wounds such as hernia incisions had become septic. A few boils also occurred among the staff of a children's hospital to which children with pustules and lung abscesses due to type "W" were admitted from time to time, and these were found to be of the "W" type. These results are summarized in Table IV.

Infections in persons not associated with maternity cases.—During the period when the above results were obtained, a number of specimens were received from persons suffering from suppurative lesions due to *Staph. aureus* but who were not in contact with breast abscess cases or hospital infected infants. The results are shown in Table V.

This series is small but it is perhaps surprising that no case of infection by a type "W" was detected among the 24 cases investigated; and the series included boils, osteomyelitis, etc. This appears to argue that the "W" strain of staphylococcus aureus had been introduced into the general community comparatively recently. It is surprising that greater spread had ap-

TABLE IV.

LESIONS FROM HOSPITAL STAFF AND CONTACTS (OTHER THAN MOTHERS AND BABIES)
(24 CASES)

1.	Abscess of face	Maternity staff at hospital "B"	"W" positive
2.	Rectal abscess	Father of baby born at hospital "C". Baby had pustules.	" "
3.	Pustules on leg	Patient admitted to hospital "B" with phlebitis. Treated on a ward with a breast abscess patient and developed pustules on fomented leg	" "
4.	Pustules on wrist	Staff at hospital "B"	" "
5.	Infected surgical wound	Clean operation in hospital "B" in theatre used for breast abscess	" "
6.	Boil	Medical officer treated breast abscesses at hospital "B"	" "
7.	Boil	Man whose wife had breast abscess	" "
8.	Abscess of leg	Staff at hospital "B"	" "
9.	Abscess of thigh	Nurse who tended a case of pustules	" "
10.	Multiple boils	Pathologist investigating breast abscess strains	" "
11.	Boil	Medical officer at hospital "B"	" "
12.	Abscess of buttock	Nurse at hospital "B"	" "
13.	Pustule of forearm	Nurse at hospital "A" after onset of epidemic	" "
14.	Infected thumb	Staff at hospital "C"	" "
15.	Abscess of finger	Staff at hospital "B"	" "
16.	Infection of finger	Student nurse—worked on maternity ward	" "
17.	Pustule on arm	Staff at hospital "A" after onset of epidemic. (Nose later found positive).	" "
18.	Boil	Gynæc. patient in hospital "A" treated by staff working on maternity ward	" "
19.	Abscess of scalp	Baby with eczema, treated in hospital "B" developed pustular eruption and deep abscess	" "
20.	Infected finger	Student nurse at hospital "C" (Nose "W" positive).	" "
21.	Pimple on arm	Hospital "B" staff	"W" negative
22.	Operation wound	Hospital "B". Had nævus of face removed. Became infected	" "
23.	Hernia operation	Hospital "B"—became infected	"W" positive
24.	Appendix operation	Hospital "B"	"W" negative

parently not occurred during the eighteen months the infection had continued in the city, particularly in view of the hospital and household infections described above. It is expected that further spread into the general community will occur.

An epidemic of boils in a brewery bottling room in the city was brought to our notice. A swab from a boil gave a staphylococcus which did not belong to type "W" but this again emphasizes the infectiousness of boils.

TABLE V.

SUPPURATIVE LESIONS IN PERSONS NOT ASSOCIATED WITH PUERPERAL INFECTIONS

Boils and abscesses	17	
Paronychia	1	
Infected wounds	2	
Generalized pustules	1	No "W" strain.
Sycosis barbæ	1	
Osteomyelitis	1	
Otitis media	1	
*Breast abscess	1	
	29	

*Girl of 12 who had not been in contact with hospital infection.

Carriers among staff.—Early in the investigation, nose and throat swabs were obtained from two of the affected hospitals "B" and "C" and from hospital "A" which was at that time unaffected. The results are summarized in Table VI. No attempt to carry out skin swabbing of the staff was possible owing to the large volume of work involved.

The same technique was used for all the routine nose and throat examinations. Two swabs were used for each person; one was used to swab both tonsils and the second swab to swab both nostrils. Each swab was planted on to a whole plate of 0.1% glucose agar, containing 1% neopeptone and 0.3% Difco meat extract. This was the routine medium used throughout the investigation for both primary isolation of the staphylococci and for the phage typing. It was found that the degree of pigmentation varied greatly with the peptone used: certain high class peptones, which gave excellent growth, showed poor pigmentation of aureus colonies. The plates were examined after overnight incubation and after a further twenty-four hours at 37° C. if negative after the first inspection. One or two colonies were picked from each plate to glucose broth ready for phage examination if the colonies were apparently pure and well separated. If the plates were crowded, replating to glucose agar was carried out prior to glucose broth. It is probable that a few carriers of the pertinent strain may have been missed by such inadequate sampling of some of the plates but the same error would apply to all series of the swabbings as the same technique was used in each case.

TABLE VI.

INCIDENCE OF STAPHYLOCOCCUS AUREUS IN HOSPITAL STAFFS

	Hospital			
	A	*B*	*C* (*old staff*)	*C* (*new staff*)
Number of staff swabbed	48	42	113	32
Staphylococcus aureus present				
Nose only positive	13	11	45	12
Throat only positive	5	5	5	5
Nose and throat positive	11	5	36	6
Nose and/or throat positive	29	21	86	23
Percentage of staff positive	60	50	76	72
Number of staff showing type "W"	2	8	25	0
Percentage	4.1	19.0	22.1	0

In the earlier swabbings coagulase tests were done on the primary cultures but since a high proportion of all the true aureus colonies present were coagulase positive this was later abandoned, since in any case the recognition of the phage "W" strains was the most important problem.

It will be seen that the carrier rate of *Staph. aureus* did not vary greatly between the various hospitals. When, however, the strains isolated were examined by means of the bacteriophage "W", a high carrier rate was found in hospital "C". At hospital "A" only two carriers were detected: these were immediately removed from duty on the ward and were not allowed to return until proved negative. At hospitals "C" and "D" this was not thought to be possible owing to the large number involved. It is interesting to note that at hospital "C" swabs were obtained from student nurses newly arrived at the hospital from various parts of the Province. *Staph. aureus* was isolated from twenty-three persons but no strain "W" was detected.

The term carrier has been used to denote a person from whose nose or throat organisms were isolated, but particularly when few staphylococcal colonies are found, the significance of

these cannot be regarded in the same way as, for instance, a few typhoid bacilli in a stool. During a normal working shift of eight hours a nurse will breathe through her nose approximately 5,000 litres of air. In a small series of air samples taken by means of an electro-static air sampler through which ten litres of air were drawn in ten minutes, many colonies of *Staph. aureus* were found and once a type "W" strain was detected. It is quite possible that the organisms found in the noses of some of the nurses are merely deposited there from the polluted atmosphere of the ward and are not proliferating and would soon disappear if the person were removed from the source of infection. It would be probably more correct to name some of these people "porters" rather than "carriers". Some were, however, true carriers and remained positive for several weeks until they received systemic aureomycin treatment.

Incidence of "W" strain among mothers and husbands.—Partly in order to determine the incidence of staphylococcus phage type "W" in the general community, nose and throat swabs were obtained from all mothers on admission to hospital "A" after the onset of the outbreak there. One phage type "W" strain was detected in a series of 327 consecutive admissions. At the same time, nose and throat swabs were obtained from husbands where possible and one phage type "W" was detected in the 94 husbands examined. It is particularly interesting that this single positive strain was isolated from the husband of the only mother who showed a positive admission swab. It is also possible that this man and woman may have acquired the "W" type at the hospital, for the swab was not taken until the patient had been in the hospital for three days.

At hospital "B" an attempt was made at the height of the outbreak there to determine the admission carrier rate, but owing to administrative difficulties, swabs could not be taken immediately on admission. Discharge nose and throat swabs of 74 women, however, showed the "W" strain in only two cases. At that time the incidence of breast abscesses in hospital "B" was approximately 10% of the women delivered and 26% of a group of infants showed the "W" strain in their noses and throats. It appears that the mothers' noses and throats did not constitute the direct source of infection in an appreciable number of cases in this outbreak. Nose and throat swabs were obtained from 22 women after the development of breast abscesses due to type "W". Eight of these women were found to be harbouring the "W" strain and 14 were negative.

Incidence of "W" strains in infants' noses and throats.—Duncan and Walker[11] have shown that the milk of a high proportion of nursing mothers becomes infected with *Staph. aureus*

TABLE VII.

RESULTS OF NOSE AND THROAT SWABS OF 103 BABIES AT HOSPITAL "A" DURING THE FIRST TEN DAYS OF LIFE

Results for the first and second halves of March, 1949

	Staph. aureus					*Phage typing*			
	March 1 to 14		*March 15 to 28*			*March 1 to 14*		*March 15 to 28*	
Number of babies showing *Staph. aureus* in nose and throat.	19	46.5%	30	48.4%	"W" positive nose and throat	5	12.2%	17	27.5%
Number of babies showing *Staph. aureus* in nose only.	11	26.9%	15	24.2%	"W" positive nose only.	3	7.3%	12	19.4%
Number of babies showing *Staph. aureus* in throat only.	1	2.4%	8	12.9%	"W" positive throat only.	1	2.4%	7	11.3%
Number of babies showing no *Staph. aureus.*	10	24.2%	9	14.3%	No "W" strain isolated.	32	78.1%	26	42.0%
Number of babies showing *Staph. aureus* in nose and/or throat.	31	75.7%	53	85.5%	Number of babies showing "W" strain in nose and/or throat.	9	21.9%	36	58.2%
Number of babies showing *Staph. aureus* in nose and/or throat for the period March 1 to 28.....				84 (81.5%)	Number of babies showing "W" strain in nose and/or throat for period March 1 to 28.....				45 (43.7%)

during the first ten days of lactation and that this infection probably originates from the nase-pharynx of the infant. In December, 1948, a series of swabs was taken from the noses and throats of infants at one of the affected hospitals—"B"—and a carrier rate of 26% of the "W" strain was found. Since it was desirable to have a control group of nose and throat swabs from children from a hospital not affected by the breast abscess outbreak, swabs were taken from 103 children at hospital "A" from which, at this time, no increased incidence of breast abscesses or pustules had been reported. The results are shown in Table VII. Swabs taken during the first two weeks of March showed a carrier rate of 21.9% and the results appeared to cast some doubt upon the significance of the phage typing results. However, within a few days breast abscesses were reported in mothers who had been delivered in this hospital and at the same time pustules due to phage type "W" became common in the children. During the following two weeks the incidence of carriers among the babies rose to 58.2%. It is very unfortunate that no true control series of children from an unaffected hospital is available.

The infection of the nose and throat of the newborn child during the first few days of life by *Staph. aureus* has been shown to be common. Torrey and Reese[12] found 88.8% of a group of newborn infants to be harbouring *Staph. aureus* at a time when there was no unusual incidence of staphylococcal infection. Martyn[13] examined cultures from the naso-pharynx of 130 newborn babies (ages not stated) and found a carrier rate of 50% of coagulase positive staphylococci. Of these coagulase positive staphylococci 55.5% were penicillin resistant but only 3.7% streptomycin resistant.

COMMENT

At the beginning of the investigation, the distribution of the cases in the various hospitals strongly suggested an epidemic due to the spread of a particularly infectious strain of staphylococcus. This was supported by the high incidence of boils, etc., in the families of mothers after their return home from the affected hospitals. Investigation of techniques showed no reason why hospitals "B", "C" and "D" should be affected and hospital "A" spared for so many months. The techniques were different in the various hospitals and no fault was common to all, other than overcrowding of the nurseries.

By means of bacteriophage typing it was shown that the majority of the breast abscesses and other infections in the affected hospitals were due to staphylococci of a particular type or at least belonging to a certain group. The use of a single phage for identification is open to criticism because it can be shown that staphylococci reacting to titre with a given phage can sometimes be subdivided into a series of subtypes according to their reaction with other phages. From the strictly bacteriological standpoint it cannot therefore be said that all strains described in this report as type "W" have been proved to be identical. The high frequency with which these strains were isolated from breast abscesses, from infants' pustules and from contacts in the affected hospitals; the absence of the same type among pathogenic strains from suppurative leisions; and the very low incidence in the noses and throats of people not in contact with the affected hospitals; strongly suggests that no serious error is likely to have occurred from this cause. Support is also given to this view by the sensitivity of the "W" strains to various antibiotics. All "W" strains were markedly resistant to penicillin and produced a powerful penicillinase: they showed approximately the same degree of sensitivity as the Oxford standard staphylococcus to aureomycin and streptomycin. This pattern of sensitivity was shown by a few strains which did not react with phage "W" but many other staphylococci isolated from suppurative lesions and noses and throats of non-"W" contacts during the investigation were fully sensitive to penicillin. However, the rise in the latter months in the percentage of strains not reacting with phage "W" in the hospitals first affected, may suggest that the strain in these hospitals has developed mutants which, though fully virulent, have lost their ability to act with this phage.

It would certainly have been desirable to examine the breast abscess strains by means of other phage filtrates but, owing to the volume of work involved, this was not possible. It is hoped that opportunity will be made to re-examine a number of the breast abscess strains in the near future.

The prevention of such outbreaks, as pointed out by Knott and Blaikley,[1] depends primarily on the exclusion of carriers of virulent infection and secondly on the control of spread within the hospital. Ideally, all new staff and patients should be swabbed, but there is no test for all definitely pathogenic staphylococci. Knott and Blaikley[1] graded staphylococci but attempts to grade staphylococci from other lesions by their method were not promising. If, as previously stated, we exclude all staff carrying coagulase positive staphylococci, we should be unable to work any unit. There is great need for further work on this important point. The situation today regarding staphylococcal outbreaks is similar to that relating to the control of puerperal sepsis before the introduction of the Lancefield grouping of the hæmolytic streptococci.

The biological activities of this "W" strain are interesting, and led a number of clinicians to suggest that it had an elective localization to skin and breast. This view is not justified, for although the majority of lesions were thus localized, pulmonary infections, suppurative lesions of the middle ear and other deep tissues were reported. The localization of the majority of lesions can be accounted for by direct spread from the site of original infection. It appears, however, that this organism has little tendency to produce a blood stream infection. During the course of the investigation the laboratory examined approximately 200 swabs from breast abscesses and the total number which occurred during the outbreak was probably well over twice this number. No case of osteomyelitis however, came to our notice, although it is said that a child early in the outbreak suffered an osteomyelitis of the clavicle. One woman who had a breast abscess developed a perinephric abscess, but no specimen was sent for examination. Only one of the infantile pulmonary infections showed what might possibly be a metastatic infection. This was case 10, Table II, which showed abscesses in the liver. The presence of abscesses in the liver would suggest an umbilical infection. That certain strains have far greater powers of invasion is suggested by the report of Harrison[14] who described a family outbreak. In a family of seven children there were, in addition to multiple examples of cutaneous infections, three cases of acute infections of bone or joint. All were due to the same bacteriophage type.

The type "W" strain was also of comparatively low virulence for mice; only one of five mice inoculated intraperitoneally with a dose of four thousand million organisms died.

In this outbreak it was possible to identify the type causing the vast majority of the lesions and it was shown that at hospitals "B" and "C" there were a considerable number of carriers of this organism among the staff but it is noted that on the date when these swabbings took place two carriers of this type were found among the staff of hospital "A" which was not affected by the epidemic until eight months later. It is also of extreme interest that when later the outbreak occurred at hospital "A" the percentage of carriers among the staff was not significantly greater. It is probable that the duties of the carriers on the two occasions are highly significant. The two carriers found on the occasion before the outbreak of breast abscesses at this hospital were employed in the mothers' ward and not in the nursery. Of the three carriers found at the beginning of the outbreak, one was the nurse in charge of the nursery and another was a consultant pædiatrician. The pædiatrician had treated a case of lung abscess due to type "W" in another hospital and stated that he had frequently carried the baby in his arms, and it is probable that he acquired the infection in this way. It is tempting to suppose that whereas on the first occasion the susceptible infants were not exposed, on the second occasion they became infected from these two members of the staff. It is extremely unfortunate that no survey was made at hospital "A" of the infantile carrier rate long before the outbreak of the epidemic there, but the absence of an outbreak of pustules in the children prior to the outbreak of breast abscesses makes it probable that no infection of the infants occurred earlier. It is interesting that small outbreaks occurred at two hospitals many miles from Winnipeg shortly after they had received nursing staff from one of the affected city hospitals.

The staff carrier appears to play a comparatively minor rôle after the introduction of the infection into the ward, as is probably the case with other ward infections. The large reservoir of infection in the babies in hospitals "A" and "B" shows the futility of dealing with staff alone.

The newborn baby's naso-pharynx has been shown to become infected with *Staph. aureus*

under maternity hospital conditions in a large number of cases (Torrey and Reese,[12] Duncan and Walker,[11] Martyn[13]). Whether the same is true of babies born at home is not known, but the type of organism must depend on the entourage of the baby, and in crowded nurseries staphylococci are acquired not only from the mother and medical staff but also from other children. Duncan and Walker[11] show the preponderance of a particular serological type in the throats of babies at one maternity unit. These results show the frequency of respiratory cross infection and probably do not apply to staphylococci only. They show the desirability of making nurseries as small as possible or leaving the baby with the mother. If this were done, the cross infections of the children might be reduced and the danger of serious outbreaks of naso-pharyngeal infections and breast abscesses probably eliminated. Our results show a very large reservoir of infection of a highly infective strain in the infants: over 50% of the infants at one hospital were harbouring the epidemic "W" strain during one period.

There appears to be no agreement concerning the method by which the mother's breast becomes infected in such epidemics as this, and the elaborate techniques for the protection of the mother's nipples with sterile coverings between suckling times would indicate that interest is centred on infection from sources other than the baby. The ineffectuality of the recognized procedures for the control or prevention of these outbreaks is shown by the experience at hospital "A". In view of the outbreaks at other hospitals in Winnipeg the staff at this hospital took a particularly lively interest in the problem of prevention. All techniques were carefully scrutinized and every recognized step was taken to prevent an outbreak of breast abscesses. This included the abolition of the use of pocket handkerchiefs by staff and patients, in view of the danger of spread by nasal carriers. Nurses and patients used paper handkerchiefs which were discarded into paper bags or antiseptic solution, and nurses were instructed to wash their hands after blowing their noses as they would after using the toilet. It should be remembered that the baby handles the nipple more than any other person and undoubtedly contaminates it with its nasal and oral flora. It has been shown that the baby's upper respiratory tract contains *Staph. aureus* in a large number of cases after the first few days of life, (Duncan and Walker,[11] Torrey and Reese,[12] Martyn[13]). This would appear to be the most common source of infection. Some breast abscesses in our series were said to have occurred in women who were not suckling their babies, but in all cases where questioning was possible the baby had been applied to the breast for at least one or two days before failure of breast feeding was admitted. Duncan and Walker[11] showed that the mother's milk frequently became infected during the first two days post-partum. It is true that breast abscesses occur occasionally in women who have had stillbirths, in newborn babies and even in males but these are comparatively rare and do not materially affect the view that infection is most frequently conveyed during suckling. Moreover, some at least of the cases of breast abscesses in non-nursing women, newborn infants and males are more in the nature of a boil than the typical breast abscess seen in lactation. In lactation the condition usually first observed is an area of hardening well away from the nipple and deep in the breast tissue, and it contrasts with the cutaneous infection spreading inwards from the skin observed in some of the other cases. Duncan and Walker's[11] excellent paper does not appear to have received the attention which it merits from those interested in the control of breast abscesses. Duncan and Walker[11] also found that 92.7% of nursing mothers showed *Staph. aureus* in their milk during the first ten days of the puerperium. They found a considerable degree of correspondence between the serological types of *Staph. aureus* in the milk and the baby's throat. By daily examination of milk and babies' throats they found that the baby's throat was infected before the mother's milk in 33 instances, simultaneously in 39 instances and the mother's milk before the baby's throat in only 15 instances. Duncan and Walker point out, however, that for technical reasons the detection of the staphylococcus is easier in the case of milk than of the babies' throats, so that earlier infection of the babies' throats may not be detected. Duncan and Walker report throat swabs only. In this investigation nose and throat swabs were taken from the babies and the nose was frequently positive when the throat was negative. It will be seen (Table VIII) that 24.7% of the babies at hospital "B" showed *Staph. aureus* in the nose alone. Had Duncan and Walker examined the babies' noses

TABLE VIII.

RESULTS OF A SINGLE SWABBING OF THE NOSES AND THROATS OF 122 BABIES AT HOSPITAL "B" DURING THE FIRST TEN DAYS OF LIFE

Examination for staphylococcus		*% of total babies*	*Results of phage typing*		*% of total babies*
Number of babies showing *Staph. aureus* in nose and throat	31	25.4%	"W" positive in nose and throat	8	6.6%
Number of babies showing *Staph. aureus* in throat alone.	13	10.7%	"W" positive in throat alone	12	10.0%
Number of babies showing *Staph. aureus* in nose alone.	30	24.7%	"W" positive in nose alone.	12	10.0%
Number of babies showing no *Staph. aureus*.	48	39.3%	No "W" strain isolated.	90	73.0%
Number of babies showing *Staph. aureus* in nose and/or throat.	74	60.7%	Number of babies showing "W" strain in nose and/or throat.	32	26.2%

as well as their throats, it is highly probable that additional carriers would have been detected whose infection preceded the infection of the maternal milk. It is possible that infected nasal secretion may pass to the back of the throat and into the baby's mouth and so be regurgitated into the terminal mammary ducts during suckling.

Although the infant's naso-pharynx is the most important source of infection of the mother's breast, it appears that occasionally infection may be transmitted in other ways, and it would appear to be a wise precaution for the mother and baby only to handle the nipples. "Breast care" should not be done by nurses who may spread infection from one patient to another. It must be recognized that the infection of the mother's nipples by the baby's nasopharyngeal organisms is inevitable if breast feeding is practised: no "breast toilet", however potent the antiseptics used or thorough the technique, can prevent this. The usual nipple treatment by a third person is more likely to introduce a new infection to the mother and infant than to eliminate one.

If and when a satisfactory method for the detection of pathogenic staphylococci is devised, all patients and staff should be swabbed before entrance to the maternity units. At present anyone suffering from a suppurative lesion or coryza should be regarded as dangerous, and appropriate measures should be taken to prevent spread of infection to infants and mothers.

Since carriers of pathogenic staphylococci are certain to gain entrance to maternity units from time to time, the organization should be designed to obstruct the spread and thereby to limit the number of cases of disease. The most important single factor is probably the division of the nursery to the smallest possible size. Ideally, it would appear that the baby should remain with the mother.

In the presence of an outbreak of breast abscesses, the infants should receive either local or general treatment with an appropriate antibiotic, with the object of eliminating the nasopharyngeal infection. Should a mother develop a breast abscess, breast feeding should be stopped, since reinfection of the mother from the baby's nasopharynx is likely and treatment of both mother and child should be considered. There is also a possibility that there is a greater danger of lung abscess through aspiration of infected milk, though the histories of the lung abscess cases show that some developed a considerable time after the cessation of breast feeding.

As previously stated, only 2.7% of mothers showed this organism on discharge from hospital "B" at the height of the outbreak, when 26% of the babies were positive. This low incidence in the mothers is probably due to the small amount of contact between the mother and baby in hospital. After their return home from hospital the vast majority of the mothers are exposed for a greater part of the day to the infection carried by the child. A small number of nose and throat swabs from mothers after their return home showed a great increase in the number of phage type "W" carriers. The persistence of the nasal or throat carrier state many months after infection is of great practical importance. In the examples of family infections it will be noted that members of families 1, 2, 3 and 4 showed the phage type "W" staphylococcus in nose or throat swabs 10, 18, 15 and 11 months respectively after delivery of the infant. Fisk and Mordvin[15]

showed the persistence of a particular type in the nose of one case for a period of three years. In our observations some carriers were free of disease for long periods of time: others developed boils from time to time. It is obvious that women infected in this outbreak may remain carriers and not only infect their newborn infants at future deliveries but also initiate future outbreaks of breast abscesses in maternity units. It would therefore appear to be advisable to swab the noses and throats of women exposed to infection during the present outbreak before future admission to maternity units; to phage type staphylococci isolated and where necessary to administer appropriate treatment.

SUMMARY

An extensive outbreak of breast abscesses is described. The outbreak was due to infection by a specific type of *Staph. aureus*. The newborn infant's nose and throat is the important reservoir of infection, from which infection is passed to the mother's breast. The initial stage of the epidemic is that of a respiratory infection and every effort should be made to prevent airborne infection of the babies.

Prevention of puerperal breast abscesses during an outbreak should include active treatment of the infants with antibiotics or other means in order to prevent spread to the mothers.

This work was made possible by money provided from the Dominion Health grants which allowed the formation of a Reference Laboratory within the Laboratory of the Department of Health and Public Welfare for the Province of Manitoba. My sincere thanks are also due to Miss D. Frisken and Miss Johnson for technical assistance and to Mrs. MacIlhagga whose untiring efforts were necessary for the collection of much information used in this report.

Grateful acknowledgment is also made to a large number of general practitioners for specimens and to the authorities of the various hospitals.

REFERENCES

1. KNOTT, F. A. AND BLAIKLEY, J. B.: *J. Obst. & Gyn. Brit. Emp.*, **51**: 386, 1944.
2. HOBBS, B. C.: *Mon. Bull. Min. Health & Emer. Pub. Health Serv.*, **3**: 11, 1944.
3. MCFARLAN, A. M.: *Brit. M. J.*, **2**: 939, 1939.
4. MARTIN, T. B. M. AND WHITEHEAD, J. E. M.: *Brit. M. J.*, **2**: 175, 1949.
5. WILLIAMS, R. E. O.: *J. Path. & Bact.*, **58**: 259, 1946.
6. MATHEWS, E., ATKINSON, H. F., SAINSBURY, P. T. AND CLEGG, H. W.: *Brit. M. J.*, **1**: 54, 1949.
7. GILLESPIE, W. A. AND SIMPSON, P. M.: *Brit. M. J.*, **2**: 902, 1948.
8. FISK, R. T.: *J. Infect. Dis.*, **71**: 161, 1942.
9. WILSON, G. S. AND ATKINSON, J. D.: *The Lancet*, **1**: 647, 1945.
10. MCLETCHIE, N. G. B.: *Canad. M. A. J.*, **60**: 353, 1949.
11. DUNCAN, J. T. AND WALKER, J. J.: *Hygiene*, **42**: 474, 1942.
12. TORREY, J. C. AND REESE, M. K.: *Am. J. Dis. Child.*, **69**: 208, 1945.
13. MARTYN, G.: *Brit. M. J.*, **1**: 710, 1949.
14. HARRISON, M. H. M.: *The Lancet*, **2**: 727, 1948.
15. FISK, R. T. AND MORDVIN, O. E.: *Am. J. Hygiene*, **40**: 232, 1944.
16. MCGUINNESS, F. G. AND MUSGRAVE, G. S.: *Canad. M. A. J.*, **61**: 356, 1949.

SURGERY IN GENERAL PRACTICE*

C. J. Houston, M.D.

Yorkton, Sask.

IT is my intention this afternoon to emphasize the part which the general practitioner must play in supplying modern surgical care to the people of this Dominion. Conversely, it is my purpose to emphasize the rôle which surgery properly occupies in the repertoire of an efficient and modern general practitioner. Such a discussion is opportune, for the ever-changing face of medical practice threatens the very existence of the general practitioner.

Great changes in patterns of practice have occurred in our time, and will continue. Of the many influences responsible for these changes, I would specify three as being of greatest importance. (1) The centralization of the doctor's work about hospitals. (2) The ever-expanding use of modern diagnostic aids. (3) The trend towards specialization in practice.

These three factors, working over the years, have been the prime agencies in making the medicine of tomorrow so different from that of yesteryear. These changes spell progress; and with all these advances, the public has received an ever improving standard of medical care. As a profession, it is our duty and privilege to see that these improvements are increased and extended, but only as long as they are in the public interest. If progress should become unbalanced, or if we note trends against the public interest, then it is not only our privilege to say so, but it is our duty to shape these tendencies into proper channels.

I am thinking today of the tendency to overdo the trend towards specialization. I am thinking also, particularly of the field of general surgery and its relation to general practice. If we carry specialization in all its phases to its ultimate conclusion, it will mean the extinction of the general practitioner. Such extinction would be a great loss to the people of Canada, and to the profession of medicine. To avoid this, and to provide the best care for the most people, the general practitioner must be retained, his status enhanced, and his calibre improved.

* Read before the Eightieth Annual Meeting of the Canadian Medical Association, Section on General Practice, Saskatoon, June 16, 1949.

It is my purpose today to emphasize the rôle which surgery can and must play in achieving this desirable end.

Before proceeding, perhaps we should define the term "general practitioner". Let us first rid ourselves of the movie concept, that a general practitioner is a man with a goatee and an inferiority complex, who rushes about in an antiquated automobile, and who cannot conduct himself properly in a modern hospital. Let us likewise discard that other metropolitan concept, that the duty of a general practitioner is merely to sort out cases and direct them to the appropriate specialist.

What, then, is a general practitioner? Let us say that he is one who looks after the general needs of the patient in his own community. In fact, he may often be responsible for a definite geographical section of that community. Let us say also, that the term general practitioner does not exclude the man with special training, or even special degrees. If a doctor is doing general work, and not limiting himself to a specialty, he is still properly classified as a general practitioner. There is also the man, who, through years of experience, has developed a special ability along one special line. That special ability also commands respect, but if such a man is likewise doing general practice, one must regard him, too, as a general practitioner.

The very term "general" in itself implies a rather full range of medical care. The general practitioner must be diagnostician and psychiatrist, pædiatrician and dermatologist, obstetrician and surgeon. How much of which branch of knowledge he must apply in a particular case will depend on circumstances and on his judgment. But again I say, he is not a true general practitioner unless he exercises a very full range of talent—and this must include some surgery.

One might go further, and say that a large proportion of the surgical care of the community should properly be supplied by the general practitioner. It is in the public interest that this be done. For, in those ailments which constitute 80% of surgical practice, the patient will get an equally efficient, and in general, a more satisfactory service from his own family doctor.

In support of this statement, I submit the following comments. The family doctor has a previous and intimate knowledge of the patient's physical state and mental peculiarities. The specialist sees only one side of the patient; the general practitioner views him as a whole. The general practitioner surgeon has a personal interest in the patient and his welfare. He is his neighbour and his friend. The patient, in turn, has a personal knowledge of, and faith and trust in his surgeon.

The patient is able to remain in his own community for his operation, and near his family and friends. This is good for his peace of mind, as well as for his pocket book.

The general practitioner knows his patient's financial status and environment and uses discretion in his charges. High specialist's fees, levied indiscriminately, provide the chief public complaint against our profession today.

The general practitioner must balance the prospects of cure with even greater delicacy than the specialist need do. He must live with the patient afterwards. He cannot afford to follow fads or as yet unproved methods. He must live with his mistakes as well as his triumphs.

The family doctor, living amongst people he serves, is in a position to bring the patient to surgery earlier, or to bring surgery to the patient earlier, than in a more complex form of practice. In illness, time is always important. In the chronic case, early diagnosis means early cure, and in the acute case, early treatment can well be life saving.

Thus we see that the general practitioner has a very definite contribution to offer to the practice of surgery.

So much for the part the general practitioner should play in the field of surgery. Now, let us look at the rôle of surgery in the repertoire and life of a general practitioner. How does it affect the man himself? and how does it alter or improve the calibre of his work?

My considered opinion is that the man who does some surgery is always a better practitioner in the other branches of medicine. There is, in general practice, a tendency to stagnate. If the interesting or challenging case is removed from his hands, the doctor loses interest in his work. Surgery which forces one to take a more decisive interest and responsibility in the outcome adds that spark which livens the whole medical viewpoint. Particularly is this true in the isolated community. There, a little

surgery may make all the difference between keeping a competent doctor in the district, and having no doctor at all. On the other hand, the community benefits by having a more alert and versatile doctor in their midst.

In the urban or more competitive communities, the same applies. There you will find that the general practitioner who does a little surgery is also practising more modern medicine in the other branches. It may well be true that a keen interest in some other special field might have a similar stimulating effect, but by and large it is true that today the general practitioner who does no surgery is losing out. He must either go back to school to specialize, go into politics, or pass into oblivion. It is a cold economic fact of modern medical life, that he must do some surgery if he is to remain in general practice. This is not so because of the occasional surgical fee, but rather in the direct influence of surgery on the rest of his practice. Therefore, I say again, that a modicum of surgery improves the doctor's general work and makes him more content to stay, a general practitioner, in the service of his community.

And now we come to that very important question: how much surgery, and what range of surgery, should a general practitioner undertake? To generalize, one might say that this should depend on the individual doctor's judgment, integrity and training: I deliberately put them in that order of importance. One must realize too, that these qualifications are never static. Judgment improves with experience, and postgraduate study and training should be a continuous process in the life of any doctor.

One might also go into detail, and say that a proper range of surgery for the family doctor could include the following: (1) Minor surgery, including a definite range of traumatic surgery. In most rural areas, tonsillectomy is a "must". (2) Many abdominal emergencies, such as the acute appendix or strangulated hernia; that is, those emergencies where time is of greatest importance. (3) It might also well include a definite but variable range of elective surgery.

Thus, one general practitioner might not attempt even the emergencies listed above and would do no elective work, while a very great many doctors would do hæmorrhoids, herniotomies, and the interval appendix, and do them very well. Cholecystectomy is well within the scope of a large number of general practitioners; and a small number are well qualified to do thyroidectomies or even gastric work.

The range of work depends on the competence of the individual. This brings us to that old and very contentious question: How can a man's competence be judged? or as one with an administrative complex would put it "How shall a man be prevented from exceeding his competence?" This question of exceeding one's competence is the key to the whole matter. Competence is as easily exceeded by specialists as by general practitioners, and the mere awarding of a specialist's degree is a very partial answer. Basically, it involves more than mere training. It is a matter of judgment and integrity. Examiners do not assess these qualities and bureaucracy has no formulæ to regulate them. They are qualities which are admittedly hard to evaluate and it is only a man's record over years which will actually prove how he has acquitted himself.

In this regard, I had thought it interesting to check some statistics on how the general practitioners of this province are discharging their responsibilities in the field of surgery. Statistics, as you know, are open to various interpretations, but these have proved particularly interesting. Saskatchewan is predominantly a rural province. It is only the larger cities which can support specialists who limit themselves strictly to their specialty, and it is only in the two largest cities that we find them in any number. I have, therefore, sought to compare some aspects of practice, and certain mortality rates in these cities, with that in the balance of the province, where all work is done by general practitioners.

By taking the total number of operations per year in the given hospital, and the number of deaths within ten days after operation, one can set up a surgical mortality rate for that hospital. The statistics used were taken from the annual report on Government-aided hospitals for 1945 and it is interesting to note that in respect to total numbers of operations, the bulk of surgery in the province was done outside of the great cities. It is also interesting to note that the mortality rates in the larger cities, as against the rural areas, compare very

favourably. In fact, they are, for the purposes of this paper, identical.

It is true that this is only a very partial story, and I mention it only to support the view that the general practitioner, outside the urban centres, can and does provide a surgical service which is comparable, at least, to the average service received elsewhere. It is likewise true that these are statistics for one province only, but Saskatchewan, with its great distances and scattered population, is an ideal field in which to visualize, and to evaluate the place of the general practitioner in the scheme of things medical.

We are all agreed that in the past the position of the general practitioner has been a most useful and an honoured one. We all want him to continue to occupy a dignified and honourable place in our profession. But now specialization is rampant, and the young graduate feels that his only hope of success lies in that direction. Likewise, state control is in the ascendancy, and wherever this is so, the trend to specialization and limitation is accentuated. Even the present system of medical education is geared, consciously or unconsciously, to turn out specialists. The very existence of the general practitioner is in jeopardy. Only if we awaken to the danger and take vigorous action, can the tide be stemmed. We are in the throes of change, but, if we set ourselves to the task, out of this change may yet come a new and even better general practitioner. If and when this comes about, surgery must retain a proper place in his development, and I have sought, in these few words, to show how the proper application of surgery to his practice will make him a better and a happier general practitioner.

Thus, we will improve his lot, and maintain the family doctor in dignity and honour in his community, but even more important than that, we will so shape our medical world that our younger graduates may feel some security in entering upon that most useful, most interesting, and most demanding of all fields of medicine, General Practice.

"Fain would I climb, but that I fear a fall." Thus Raleigh on a pane of glass; to which Queen Elizabeth added, "If thy heart fail thee, then why climb at all?"

THE ROLE OF THE GENERAL PRACTITIONER IN THE PREVENTION OF TUBERCULOSIS*

John Orr, M.D.†

Fort San, Sask.

THE search for tuberculosis cases is becoming ever wider. The extension began in this province with the establishment of chest clinics with their emphasis upon examination of suspects and contacts. It extended to the examination of selected groups or even whole communities, and with the introduction of the miniature x-ray film, there began the mass survey of the whole population.

Mass surveys. — Emphasis would appear to be on mechanization and on masses of people. This could conceivably tend to a lack of interest on the part of the medical profession, for after all, the practising physician is concerned primarily with the individual. However, it is well recognized that mass surveys are an important factor in case finding, and since the tuberculous sick person cannot altogether be regarded as an independent entity, there should be a very intimate and cordial relationship between the sanatorium physician conducting mass surveys and the family physician, whose responsibility to the family and to the community is no less than to the individual.

The efficiency of mass surveys is largely dependent on organization, canvassing, hard work, public interest and co-operation of the medical profession. No one by active co-operation and moral support can do more to create public interest and consequent success of surveys than the general practitioner, and no one by indifference can do more to create public apathy and failure.

With the extension of surveys the rôle of the general practitioner in the discovery and eradication of tuberculosis might appear to be small. Actually mass surveys, though important, are merely a day's incident in a period of possibly four years. Attendance, however good, is never perfect. People travel, and possibly in areas not so infection-free as their own. Then, too, there is always lying latent

---

* Read before the Eightieth Annual Meeting of the Canadian Medical Association, Section on Preventive Medicine, Saskatoon, June 15, 1949.

† Director of Medical Services and General Superintendent, Saskatchewan Anti-Tuberculosis League.

next year's crop or even next month's crop, which becomes the immediate concern of the family physician.

In mass surveys of presumably healthy people many previously unsuspected new active tuberculous cases have been found (0.43 per 1,000 in 1948 when 202,000 were examined in Saskatchewan). It is, therefore, logical that even more attention should be concentrated on those who are ill, among whom the incidence of active tuberculous disease is probably three times as high and among whom we know there are unsuspected tuberculous cases.

Hospital admission x-ray. — In 1947 there were 121,951 people admitted to Saskatchewan hospitals—14.5% of our population. Here, then, is a group for which the miniature film can, to a large extent, serve to bring together the general practitioner and organized medicine in the tuberculosis picture. With this in mind, and principally, with the aid of the Dominion Tuberculosis Control Grant, the Saskatchewan Anti-Tuberculosis League has in the past year installed self-contained photofluorographic units in 14 of the larger hospitals and medical clinics—11 hospitals and 3 clinics. In addition, photofluorographic attachments have been installed in 24 smaller hospitals which are equipped with 100 or more milliampere machines. It is the League's intention to extend this program and it is hoped the medical men will co-operate in seeing that all their hospital admissions have the benefit of this service. In this regard it is realized that an admission x-ray is not always practical, but the practice should be followed whenever possible.

Recently one such so-called admission film was read as showing definite evidence of a tuberculous lesion. Inquiry showed the patient had been admitted on account of a threatened abortion. The film had been taken at time of discharge; tuberculosis was not suspected. Subsequent follow-up and sanatorium admission gave a positive sputum. There is no doubt that in past years such cases contributed largely to the accelerated rate of infectivity and consequent breakdown among nurses in general hospitals.

In the large centres where there is a radiologist the films are read by him. Elsewhere, the films are forwarded to one of our three sanatoria. In the smaller centres where miniature films are not available the hospitals have gone on record as being willing to take a large flat film and forward it for interpretation.

Private practice. — There is still the large group visited in their homes, or who consult doctors in their office practice. In some instances it should now be an easy matter to make a satisfactory arrangement with the hospital to have a miniature film taken. In many cases, however, this will not be possible and the physician must resort to other methods. Even with or without the benefit of the x-ray these methods are still more important for all of us. I shall refer only to a few: they are simple and easily applied if we are but interested and think to make use of them. Some of you may have your regret that a particular case was not discovered earlier. I think you will agree that most such mistakes are made, not because we don't know things, but because we do not do them.

History. — Necessity for the time-honoured history still remains in the forefront. It need not be long but it must have sequence. If you always follow the same orderly plan the history can be concise, full of interest, and taken in a minimum of time. It can determine much for you and in itself often gives the clue to a correct diagnosis. The disease, however, can be deceiving, full of seeming contradictions, and causes more than its share of surprises. A history of exposure in a tuberculosis family or to a known source of infection may be revealed. Such a case should be doubly suspected and followed; but one too has to bear in mind that the disease has no great respect for family. Seventy per cent of our cases have no family history of tuberculosis. The age group showing the highest morbidity is 18 to 30 and should likewise be deserving of special consideration. Again, tuberculosis has no respect for age. A recent pamphlet issued by the United States Public Health Service states that 52% of all tuberculosis deaths in the United States in 1947 occurred in the age group over 45: In Canada, where we have a larger proportion of agricultural workers, the percentage is lower but at approximately 40 is still quite high.

Thinking of symptoms.—Seventy per cent of our patients are referred to us by general practitioners not on account of family history but on account of symptoms. These are many and varied. In a series of 200 minimal cases admitted to Fort Qu'Appelle Sanatorium the

most common initial symptom was malaise. Chest pain was a close second, but first on the list as a cause for the patient to seek medical advice. The most frequent symptoms, though not initial, were production of sputum and cough. These latter symptoms usually are not troublesome. Some patients appear to be unaware of their presence and at first may deny having them. Yet such cases, and more particularly the chronic cougher, if given a sputum container not infrequently will present a positive sputum.

In ten cases the prominent feature was erythema nodosum. This condition is often said to be either a tuberculous or rheumatic manifestation. The percentage I have seen reported from European countries as tuberculous varies from 70 to 90, and it probably varies in different localities in this province. The problem is of sufficient importance to at least suggest the necessity of the medical profession reorientating the signs in their minds, associating them primarily with tuberculosis, and relegating the rheumatic feature to secondary consideration. In our experience the vast majority are tuberculous and all should be so regarded until proved otherwise. Very occasionally erythema nodosum is accompanied, or shortly followed, by a very acute type of tuberculous disease.

An ischio-rectal abscess or a fistula-in-ano is occasionally associated with tuberculous disease and should call for more consideration than local examination and treatment.

Loss of weight is a common symptom but it is rather interesting to note that in the series mentioned eleven adult cases gained weight while still carrying on their daily tasks. It is well recognized that even the far advanced false convalescence case may gain weight while at rest but it is not so generally appreciated that some tuberculous cases at work do for a time gain weight in the face of an advancing lesion.

Other presenting symptoms in the above series were digestive disturbances in 29 cases; frank hæmoptysis in 17, and menstrual disturbances in six. Strangely enough in twelve cases the prominent symptom was headache.

Presenting symptoms may be vague or at least not troublesome. Associated with them may be the picture of perfect health which can be too readily accepted as justification for neglect. Much has been said of the insidious nature of the disease and in the main this is true, but not infrequently it is ushered in as an acute debilitating illness, retrogresses and occasionally is labelled as something else. One of the most important factors in its diagnosis is, "keeping it in mind".

Tuberculin test.—One of the best ways of keeping the disease in mind is to have a bottle of tuberculin handy on your desk or in your bag. Twice a month or more each of our three sanatoria sends out a fresh supply of tuberculin, which is diluted and ready for use. The service is free of charge and can be had by any doctor in the province simply for the asking. The tuberculin test is of real value in demonstrating tuberculous infection, but it is not completely fool-proof. In the presence of an acute fever or in the presence of advanced tuberculous disease the reaction may be negative. In the latter, there should be little difficulty in making the diagnosis from the history and abnormal physical signs.

Just a few weeks ago a special survey of a closely knit community of some 450 persons was conducted on account of a discovered case of miliary tuberculosis. Three new cases were found; two of these are of special interest. A member of our staff in reporting the tuberculin reactions discovered a case of erythema nodosum; chest x-ray film showed a definitely active minimal lung lesion. The second case had a negative tuberculin reaction. A brief history showed there was sputum; sputum analysis was positive for tubercle bacilli; and the x-ray revealed gross bilateral lung disease. The case was, no doubt, the original spreader.

Sputum tests.—Just as it is wise to have tuberculin on hand, so too is it advisable to have a few ready-to-mail sputum containers, for there are instances even when the x-ray appears typical of anything other than tuberculosis, where one can get a positive result.

Chest clinics. — Chest clinics at strategic centres are a necessary adjunct to any tuberculosis program. They not only serve as a clearing depot for tuberculous patients but should be, and often are, of real value in helping to solve at least some of the problems of the family physician. They could be of even greater service and a good deal of time and worry could be spared the clinic physician, if a tuberculin test were done before many, or all, of these cases are referred.

Trend towards eradication.—Sanatoria were originally built to treat people who were sick. Very little was said about the value of segregation, because tuberculosis infection in adult life was universal; and hence for many years even the tuberculin test was largely discontinued. It would now appear from the experience of this Province that where sufficient beds are provided for treatment, segregation results in disappearance of the disease by the de-infection route. That there is a trend towards eradication of the disease can be supported by the following facts:

The tuberculosis death rate has fallen from 44 per 100,000 in 1921 to 18 per 100,000 in 1947.

The number of old active cases for readmission has remained about stationary, although the ex-patients living have increased nearly six-fold in the period between 1925 and 1948.

The infection incidence (positive tuberculins) in primary school children with an average age of 10 to 11 years fell from 51% in 1921 to 6% in 1947. The infection incidence in normal school pupils with an average age of 18 to 20 years fell from 75.6% in 1921 to 9.4% in 1948. In other words, infection in children and young adults is accumulating at a rate of one-half of 1% per year. At the same rate this should mean that at 60 years of age 30% of our younger generation will be infected and 70% will escape infection, providing we do not have more than one great war and one great depression in the next generation. If the rate of de-infection increases in the future as it has in the past the proportion escaping infection will be greater and consequently also the number escaping disease.

Coincident with the decrease in the infection rate, there has been a decrease in the number of new active cases discovered. This fall in numbers affects all age group up to the age of 50. Thereafter, there is an increase but this is small in proportion to total numbers.

As the number of examinations increased from the year 1921 so too was there an increase in the number of new active cases discovered until the year 1930, in which year 686 new cases were discovered in 10,873 examinations. Since 1930 the number of examinations has been increasing and the number of new active cases decreasing until in 1948 there were 440 new cases discovered in 229,106 examinations. With increased facilities for discovery of hidden cases, as already noted, the number of active cases will probably increase in 1949 and 1950.

Some may point to the fact that our death rate has been more or less stationary for the past ten years. Possibly this can be explained by the adverse conditions through which we have come. Saskatchewan suffered depression and drought from 1930 to 1938 when the provincial income was reduced to its half. There has been an emigration of 200,000 young people to other provinces between 1931 and 1946. During the recent war some 75,000 youths joined the armed services, entered more highly tuberculized areas, contracted more than double the incidence of tuberculosis of the same age group at home, thus increasing both the case rate and death rate.

It would appear that given normal conditions and by making proper use of facilities which are available tuberculosis can be reduced to a minor cause of death. What is needed is a tuberculosis-conscious and co-operative medical profession and people.

THE ROLE OF THE PRACTISING PHYSICIAN IN THE PREVENTION OF CANCER MORTALITY*

A. J. S. Bryant, M.D.

Regina, Sask.

THE problem of cancer control has in recent years come very prominently before both the profession and the lay public. This is so for many reasons. Educational groups have become active in presenting the public with information about the disease. Statistical reports have presented disturbing facts about its incidence. In the past 20 years, it has moved from 4th to 2nd cause of death in Canada and the United States. (In actual figures: 83/100,000 in 1927 to 124/100,000 in 1947, in numbers 7,919 to 15,605, or 1 death in 7.5). The medical profession has concerned itself increasingly with the development of programs for its control. Departments of Health of governments both federal and provincial have assigned grants of considerable proportions, for assisting in the establishment of acceptable cancer control programs, providing optimum care at minimum cost to the cancer sufferer.

* Read before the Annual Meeting of the Canadian Medical Association, Section on Preventive Medicine, Saskatoon, June 15, 1949.

In any such program, it is recognized by all agencies concerned that the general medical practitioner plays a vital and invaluable rôle. It is an established fact that cancer mortality can only be reduced by early diagnosis and early treatment. The practitioner occupies the strategic position in this battle against cancer; since it is he who makes the first contact with the patient. His decisions may determine life or death for the patient. It therefore naturally follows that an alert, keen "cancer-conscious" body of general practitioners eager to co-operate in the best interests of the patient is a most valuable asset of any program for control of this disease.

The management of cancer through the years has in most centres of the English-speaking world at least, pursued a course of greater and greater centralization of treatment, either as voluntary, conscious effort to improve cancer treatment, or as a public health measure, sustained and administered by state legislation.

Thus, we have the record of the first cancer ward, opened June 19, 1792, at Middlesex Hospital, London, England. It was a 12 bed ward supported by an endowment of £3,500 from Mr. Samuel Whitbread. It provided hospitalization for an unlimited time for cancer patients, "until either relieved by art or released by death, unless it should be thought advisable to discharge them for ill behaviour". Such features as an out-patient department, accurate and detailed clinical records, the study of allied diseases and the investigative aspects of the cancer problem were emphasized even in those times. About one hundred years later a separate wing known as the Cancer Charity of the Middlesex Hospital was erected. A similar story could be told for Memorial Hospital, N.Y. and Christie Hospital in Manchester.

As an example of a state program of cancer control, let us examine the Pondville State Cancer Hospital, Massachusetts. Following a popular movement of interested professional and lay persons in 1926, the Legislature of this State passed the first legislation in the United States to provide a hospital "to promote the prevention and cure of cancer and the extension of resources for its care and treatment". As a result June 21, 1927, the Pondville Hospital was opened, and today has been expanded to a capacity of 139 beds. Modern diagnostic, surgical, radiotherapy, out-patient follow-up services, etc., are provided. Now 30 of the 48 states as well as District of Columbia and Puerto Rico have enacted some form of cancer legislation.

In Saskatchewan, the origin of the cancer control program dates back to the deliberation of the Cancer Committee of the College of Physicians and Surgeons in 1929. This committee recommended: (1) The establishment of two diagnostic and treatment cancer clinics, one in the south and one in the north. (2) The purchase of a sufficient quantity of radium to provide radiotherapeutic treatment at the clinics. (3) The setting up of a politically independent and widely representative commission for overall direction of the program. On March 27, 1930, the Saskatchewan Cancer Commission Act incorporating these recommendations was passed by the Legislature.

It is interesting to observe, that the provisions and regulations under the Act called for the organization of the Saskatchewan clinics in a manner very similar to the recommendations of the American College of Surgeons. These recommendations appeared also in 1930, in a publication entitled "A Minimum Standard for the Organization of Service for the Diagnosis and Treatment of Cancer". This coincidence is, I believe, a real tribute to the foresight and sound judgment of the members of that original Cancer Committee of the College of Physicians and Surgeons of Saskatchewan, and the Cancer Commission of the Provincial Government.

It is therefore clear that the trend, so far as management and treatment of this disease is concerned has been away from the practising physician, toward the concentration of cases in suitably equipped diagnostic and treatment clinics. Where then does the general practitioner fit in in a cancer control program?

There can be no doubt that his greatest service is rendered in the early detection of the disease. Great interest has been aroused recently in so-called "Cancer Detection Centres". There have been many protagonists and many antagonists. The general consensus, after the smoke of battle has cleared away, however, would appear to be that expressed by Grantley W. Taylor, of Harvard Medical School, Boston. He stated recently, "it may well be found that greater numbers of early cancers can be found with less expense of time and money by intensified education of the laity to report early symptoms and of the medical profession to

evaluate these early symptoms.'' It is incumbent therefore upon the practising physician, if he is to render this service efficiently and well to be aware of the disease and alert to the complexity of symptoms which may mean its presence. This is no easy task. It implies an eagerness to constantly broaden and improve his knowledge, even though he may only see a few new cancer cases per year. The average seen in this province is 3 per physician (1,800 new cancer cases for approximately 600 physicians) and would agree with statements made by others, such as W. V. Johnson (this *Journal,* March, 1949). In discussing mortality from cancer of the bowel, he states in his 24 years of general practice, he has seen ''2 or 3 dozen patients with cancer of the bowel''.

In an effort to make the practising physician better fitted for his rôle in cancer detection, greater emphasis is being placed on the teaching of cancer, in medical schools, postgraduate courses and refresher courses. In addition, professional teaching films, special articles in the professional journals and indeed an entirely new medical journal called *Cancer,* are currently available for this purpose.

Closely linked with cancer detection is lay education. Much of this of course, is carried out by such non-professional groups as the Canadian Cancer Society. These groups all have medical advisory boards for guidance and direction on the administrative level, but there is no doubt that the active working units in small towns and country points require and welcome medical support. Here then is another opportunity for the practising physician to render service to cancer sufferers and the cancer control program. Again quoting Grantley W. Taylor, ''there can be no question that as a result of such education, many patients seek medical advice earlier than they would have done otherwise.''

In the Province of Saskatchewan, the cancer clinics operate exclusively in a consultative capacity, accepting only patients referred on suspicion of cancer. Ethical relations are maintained with the practising physician at all times, complete reports are sent to him and every effort made to keep him in touch with the progress of the case. Upon dismissal following treatment, it is recommended that the patient visit his local physician for follow-up examinations, at the time of his re-appointment at the clinic for this same purpose. It has been felt by some that these methods of maintaining the interest of the practitioner might be supplemented and early cancer detection facilitated by encouraging the practitioner to perform certain diagnostic procedures leading to a possible cancer diagnosis. This matter is currently under serious consideration. It may be said without hesitation that the co-operation of the practising physicians in this province has been gratifying indeed.

In the matter of assisting with lay education, the practising physician in Saskatchewan has exhibited a very satisfactory interest. Where circumstances permit, many have lent their enthusiastic support to the cancer education program and the result has frequently been the enlistment of the entire community in this aspect of cancer control.

In this province, the enlistment of the general practitioner in the detection aspect of the cancer control program has resulted in the reference to the treatment centres of large numbers of early lesions. This is true especially of cases of cancer of the accessible sites, skin, oral cavity, lip, breast and female genital tract. These, in a 5-year period at the Regina Clinic constituted 64.5% of all cancers seen. It is in these groups particularly that we may confidently expect to achieve increasingly greater cure rates. Indeed this has already happened as regards lip cases. Dr. Charles Burkell of the Saskatoon Clinic is later to review over 500 proved cases of carcinoma of lip treated at the two Saskatchewan Clinics. Over 90% of these have remained free of disease for five years, the highest figure yet published in the literature. The alert practising physician is *in large part* responsible for this figure, since many cases were referred in their early stages.

In conclusion may I say, that although centralization of cases for the better management of this disease has, I believe, been the correct trend, nevertheless it is equally necessary to ensure the interest and co-operation of the practising physician in the very vital problem of earlier detection. Better and more professional education, both undergraduate and postgraduate, refresher courses, etc., have in the past, and can in the future contribute immensely to greater efficiency in detection. I believe the practising physician is to be congratulated for his success to date, but we must not be complacent, indeed we must continue to strive for greater success in the future.

STREPTOMYCIN IN TUBERCULOSIS*

M. Aronovitch, B.Sc., M.D., C.M., F.R.C.P.[C.], F.C.C.P.† and N. Lewin, M.D.‡

Montreal, Que.

THE efficacy of streptomycin in the treatment of tuberculosis is no longer open to doubt. The ever-increasing reports in the literature attest to its value, but these reports are still tinged with caution and at times hint at disappointment. There is, at one and the same time, enthusiasm for the effect of the drug on tuberculous lesions and doubt and disappointment because the effect is not sufficiently marked, or is complicated by some of the perverse actions of the drug. That streptomycin will affect tuberculosis beneficially is now an accepted fact; that it will of itself cure tuberculosis is open to grave doubt. These are the two facts which make this drug at once the most valuable and the most disappointing drug in tuberculosis therapy. In many hospitals the drug is now being tried in many different ways and the results are being published, and it may be years before the best dosage schedules for various types of cases can be drawn up.

Soon after Schatz, Bugie and Wachsman in January, 1944, announced the effect of streptomycin on the tubercle bacillus, experiments *in vitro* and *in vivo* were undertaken. Much of the early work was done by Feldman and Hinshaw and it is to them that we owe chiefly the firm foundation on which streptomycin therapy rests, the firm foundation of *in vitro* experimentation, animal inoculation and clinical observation.

In vitro experiments soon established that virulent tubercle bacilli were affected by streptomycin and that 10 units per c.c. could inhibit the growth of the bacillus while lesser amounts could partially inhibit its growth. These experiments themselves did not mean much, as many substances can inhibit the growth of tubercle bacilli in the test tube, but they did furnish a basis for dosage to be used in the experimental animal, *i.e.*, an attempt was made to maintain a blood level of streptomycin in the experimental animal which would equal the amount necessary to inhibit the growth of tubercle bacilli in the test tube.

Feldman and Hinshaw had been working on the effect of sulfonamides in the guinea pig with tuberculosis and they soon tried the effect of streptomycin. Using the high dosages suggested by the *in vitro* experiments and with frequent injections they were able to affect markedly and favourably the course of tuberculosis in the guinea pig. So amazing were their results that the control or untreated guinea pigs died riddled with tuberculosis while the treated animals survived and often showed no gross evidence of tuberculosis. The only fly in the ointment was that viable tubercle bacilli could be recovered from the spleens of most of the treated animals and progressive tuberculosis would develop after treatment was stopped. These results were confirmed by other workers on guinea pigs and other animals and the opinion then began to be formed that streptomycin was not bactericidal but only bacteriostatic. One or two reports at this time suggested that combinations of streptomycin with promin or mapharsen or chaulmoogra oil were more effective in the guinea pig than streptomycin alone, but the clinical work which went ahead was confined to streptomycin alone.

In the first cases the drug was employed in doses varying from 4 to 10 grams daily given intramuscularly at intervals of 3 to 4 hours over periods ranging from 2 to 4 months. On the basis of these early cases with very encouraging results further series of cases were begun. It is interesting to read the reports in the literature coming out in rapid succession and showing how enthusiasm waxed and waned as patients improved and then became worse or succumbed. These early reports indicate also the beginning fear of the complications of streptomycin and the beginning realization of the occurrence of tubercle bacillus resistance to the drug.

By June, 1947, some 1,000 cases of tuberculosis of various sorts had been treated by streptomycin in the United States and in spite of its high price and the fear of complications it was increasingly evident that the general public was waiting eagerly for wider use of the drug in tuberculosis.

At this time, on the basis of reports by Bunn on Veterans' Administration patients and Feldman, Hinshaw and Pfuetze on cases super-

* From the Grace Dart Home Hospital and the Mt. Sinai Sanatorium.

† Senior Physician, Grace Dart Home Hospital, Medical Consultant, Mt. Sinai Sanatorium.

‡ Medical Director, Mt. Sinai Sanatorium.

vised by the Mayo Clinic, it was evident that the suppressive effect of streptomycin on tuberculosis was marked, and we were ready to try the material in Montreal. Some cases were started at the Mt. Sinai Sanatorium in July, 1947, and a few months later cases were started on treatment at the Grace Dart Home Hospital. After more than a year of experience with streptomycin it seems worthwhile to record our results and conclusions.

Before starting treatment several factors had to be considered. The earlier dosage schedules for streptomycin were drawn up on the basis of test tube and animal experiments and resulted in the high dosages originally employed. Tuberculosis in humans is a far different disease from that in animals and often shows a tendency to spontaneous healing. So long as the effect of the drug is bacteriostatic and not bactericidal there is no point in using tremendously high doses in the human. As long as the effects of the bacillus can be suppressed, smaller doses may help the individual overcome the disease, except in such uniformly fatal cases as tuberculous meningitis and acute miliary tuberculosis. This concept was realized by workers in the field who at this time began to employ smaller doses and the consensus was that one gram a day was sufficient in ordinary cases. This smaller dosage prevented many of the serious complications which had previously been encountered.

Again an interesting experiment by Feldman and Hinshaw showed that the frequent dosage schedule previously employed was unnecessary. This frequent dosage schedule every 3 to 4 hours seems to be a direct transfer from the use of penicillin intramuscularly. Streptomycin, however, is not excreted as rapidly as penicillin and tends to have a cumulative effect in the body. Detectable therapeutic levels are present in the blood for 6 to 8 hours after a single intramuscular injection.

Feldman and Hinshaw tested various dosage schedules in guinea pigs with tuberculosis and found that it made little difference whether the drug was given every 3 hours, once a day or in alternate weekly courses. Their best results, however, were found with injections twice a day twelve hours apart. On the basis of these findings we have used one gram a day as our standard dosage with two intramuscular injections as our standard frequency of dosage in most of our cases, varying from this in certain selected cases only.

Another finding of interest is that streptomycin resistant strains of the tubercle bacillus occur after 40 to 60 days of treatment and we therefore limited our courses of treatment in most cases to two months. After a single course of treatment the patient was observed for some time. If necessary a second course of treatment was then given after two months of such observation. It was hoped to avoid streptomycin resistance in this way.

The reason for the efficacy of the smaller and infrequent dosage schedule is obscure. The blood level of streptomycin may be no index of its tissue level in the tubercle itself. Again it may be that a single attack with streptomycin may not kill the tubercle bacillus but may destroy its reproductive facilities for hours or even days so that widely spaced injections may therefore be just as efficacious as frequent ones. The patient's own resistance has already been mentioned. At any rate, the effect is undoubted and the treatment is much easier to bear as far as the patient is concerned.

Between the two institutions we now have completed treatment on 44 cases. This includes all cases who received the drug even if they died very soon after the start of therapy. It does not, however, include a number of cases who are under treatment at the time of writing, some of them on a somewhat different dosage schedule from that described above.

The general effects of the drug on a sick patient are remarkable. Within very few days there is a rapid subsidence of the toxic effects of the disease. The temperature comes down, the pulse slackens, the patient experiences a sense of well being, eats better, sleeps better, and starts to gain weight. The marked constitutional benefit so clearly evident may in some cases be illusory, as the pulmonary lesion may spread in spite of the feeling of well being. It is therefore necessary to be cautious in stating the prognosis is improved until one has seen serial x-ray studies. In most cases there is radiological improvement concomitant with the constitutional improvement.

After ten days to two weeks of therapy the patient may complain of some dizziness, ataxia, blurring of vision, and some vague digestive upsets. This is especially true of patients who are lighter in weight. On the dosage employed

these complaints can be disregarded as they will disappear in a few days. The caloric tests on the ears in most of these patients were negative. Even if a certain amount of dizziness remains it will pass off after cessation of therapy. Most cases of this mild dizziness are seen in women, presumably because of their lesser weight on the same dosage as are the male patients. We have encountered only one case of moderately severe labyrinthine disturbance and this gradually wore off after therapy was discontinued. There have been two cases of generalized dermatitis, one of which was severe. The less severe of these cases was moderately well controlled by pyribenzamine therapy at the same time as the streptomycin. In two cases necrotic lesions appeared at the site of the injection. This complication was apparently due to an impurity, as a change in the brand of streptomycin used prevented its recurrence.

Several nurses who handled the drug developed a dermatitis of the hands and face. This appears to have been an acquired streptomycin sensitivity and it was somewhat difficult to control. Patch tests with streptomycin on these nurses were positive. When they were relieved of duties involving the handling of streptomycin the dermatitis cleared up. When they resumed these duties the skin lesions reappeared. As a result of this experience the use of rubber gloves by all persons handling the drug appears to be advisable.

TABLE I.

STREPTOMYCIN IN SELECTED TUBERCULOSIS CASES

Markedly improved	10	23.0%	
Improved	19	43.0%	
			66.0%
No Change	10		23.0%
Worse	2	4.5%	
Died	3	7.0%	
			11.5%

Among the findings of interest is an eosinophilia varying from 5 to 15 % which we have observed in the majority of our cases. Another finding of importance is a reversal in the positivity of smears and cultures. In the usual course of events when a sputum smear is negative the culture may be positive. With streptomycin therapy it often happens that the smear may be positive but the culture negative. The exact cause for this is undetermined. It may be that the tubercle bacilli seen on smear are dead. On the other hand, it may only be that their reproductive facilities are damaged by the therapy. Or else reproduction may be inhibited by small amounts of streptomycin present in the inoculum.

The effect on the tuberculous lesions is variable. The general effect on the patients as a whole is set forth in Table I. It will be seen that improvement occurred in over 60% of the cases. This is considered to be improvement which would not have occurred without the use of streptomycin or else would have occurred less rapidly. By improvement in these cases we mean clinical improvement in symptoms plus signs of radiological clearing in serial x-rays or conversion of sputum to negative. If we were to judge by symptoms and signs alone, improvement can be seen in almost every case; *i.e.*, the cases we have labelled unchanged almost all showed decrease in toxicity, some reduction in sputum and some weight gain. However, if the radiological picture was unchanged and the sputum remained positive, we did not feel justi-

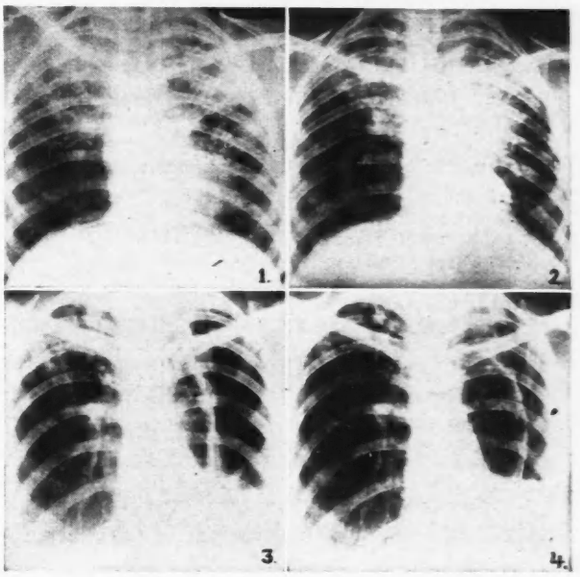


Fig. 1.—Bilateral pulmonary tuberculosis with far advanced disease and cavities on both sides. There is a considerable exudative component to the disease. **Fig. 2.**—Marked clearing of the exudation after two courses of streptomycin therapy. The cavities remain relatively unchanged and there is considerable disease surrounding them. In spite of streptomycin there is a large area of new disease in the left hilar region illustrating the fact that spread may occur even during therapy. **Fig. 3.**—Considerable exudative disease in the right upper lobe in a young girl who had a tuberculous empyema on the left side. **Fig. 4.**—Improvement after two courses of streptomycin therapy. In this case the pleural fluid was now sterile and the right upper lobe lesion had cleared markedly. Since then the empyema has disappeared completely and the patient has been discharged and is an apparently arrested case.

fied in recording them as improved. Of the cases labelled worse or dead we might say that they died in spite of the use of streptomycin, *i.e.*, the streptomycin had no effect in making them worse.

The absolute criterion of improvement in tuberculosis is conversion of sputum from positive to negative. We have labelled some patients improved even if there was no sputum conversion because we feel that the streptomycin helped considerably in bringing the patient to a stage where other procedures could be tried. That is, without the use of streptomycin these cases could not be considered for collapse therapy of some sort; with its use sufficient improvement occurred so that collapse therapy could be instituted.

Analysis of our results from the absolute viewpoint of sputum conversion to negative is shown in Table II. In the term negative sputum

TABLE II.

Sputum converted			
Streptomycin plus sanatorium regimen	5	12.0%	
Unsuccessful collapse prior to streptomycin	9	22.0%	
Additional collapse during streptomycin	6	14.5%	
	20		48.5%
Sputum still positive (With or without additional collapse measures)	21		51.5%

we include gastric lavage and culture of both sputum and gastric aspirations. Our results in this respect are somewhat difficult to analyze because we have not felt justified in withholding any forms of therapy which would lead to more rapid recovery. In other words, we have used the whole armamentarium of tuberculosis therapy with streptomycin as an adjunct and have not relied on streptomycin alone. The number of cases converted to negative is close to 50%. That is, of 41 cases with positive sputum prior to the use of streptomycin 20 are now consistently and completely negative. Fourteen of these 20 turned negative after being positive for many months on their existing methods of treatment. It is fair to consider that streptomycin played a considerable part in turning these people negative. In the other 6 a combination of streptomycin and collapse therapy was productive of a good result and it is impossible to say how much part each method played. Of the 21 who did not become sputum negative many were improved and have now become candidates for other methods of therapy which it would otherwise have been impossible to employ.

The literature on streptomycin stresses the fact that it is most efficacious in exudative types of disease. We have broken down our pulmonary cases into the exudative, hæmatogenous and fibrotic types as judged from x-ray appearances and the history of duration of disease. We have not analyzed the effect of streptomycin on the size of cavities because we have found the effect so small as to be negligible. Our findings are detailed in Table III. The effect on exudative disease is marked; that on hæmatogenous disease in our series even more so.

TABLE III.

EFFECT ON PULMONARY LESIONS (X-RAY)

Exudative			
Marked	5	24.0%	
Moderate	9	43.0%	
			67.0%
None	5	24.0%	
Worse	2	10.0%	
			34.0%
Hæmatogenous			
Marked	3	75.0%	
Moderate	0		
None	1	25.0%	
Worse	0		
Fibrotic			
Marked	0		
Moderate	2	12.5%	
None	14*	87.5%	
Worse	0		

*In some cases sputum became negative although x-ray remained unchanged.

The dramatic effect on hæmatogenous lesions is illustrated by the following cases.

Miss M.A., a young white girl of 20 years was admitted to the Mt. Sinai Sanatorium on September 15, 1947, with complaints of fatigue, weakness and cough of four months' duration. She had had two attacks of jaundice during the previous year.

Investigation revealed bilateral upper lobe lesions of the stippled discrete character considered to be hæmatogenous in type. There was no sputum, but the gastric washings were positive for tubercle bacilli on smear and culture. Our previous experience with this type of lesion has been bad. The disease spreads slowly and progressively from apical to basal portions of the lungs.

From September 22 to November 22 she was given a first course of streptomycin in doses of half a gram twice a day intramuscularly. There was some clearing of the abnormal shadows in the lung fields within a month after the start of streptomycin therapy. As the gastric lavages were still occasionally positive for acid-fast bacilli a second course of streptomycin was started on January 8, 1948 and continued until March 6. The gastric lavages became negative for acid-fast bacilli on smear and culture at the end of January, 1948, and have remained negative since that time. The patient feels well and has gained 20 lb. in weight and has been doing housework for the past six months. There has been

almost complete clearing of the abnormal shadows in the lung fields; a few strands only remaining.

Even more striking is the following case of disseminated tuberculosis.

Mrs. J.M., a young married woman, 23 years of age, was admitted to the Mt. Sinai Sanatorium on September 25, 1947, complaining of loss of appetite, loss of weight, cough, sputum, hoarseness, difficulty in breathing and a mass in the left side of the neck.

She gave a history of a right-sided pleural effusion in August, 1945, at which time she had been in the Montreal Homeopathic Hospital. In January, 1946, she was admitted to the Royal Edward Laurentian Sanatorium where she was found to have tuberculosis of the larynx and epiglottis. On admission to the Mt. Sinai Sanatorium she was found to have a large mass of discharging glands in the left anterior triangle of the neck. Pus from the discharge was positive for tubercle bacilli on smear and subsequent culture. The pharynx, epiglottis and larynx showed evidence of tuberculous ulceration. The chest x-ray showed the typical picture of miliary tuberculosis. The sputum was positive for tubercle bacilli on smear and subsequent culture.

Streptomycin therapy was started on September 26, 1947, with 2 gm. intramuscularly daily and half a gram by aerosol to the larynx. The patient improved symptomatically within the first month after therapy was begun. Cough lessened, the discharge from the glands diminished, the appearance of the epiglottis and vocal cords was better and she began to gain weight.

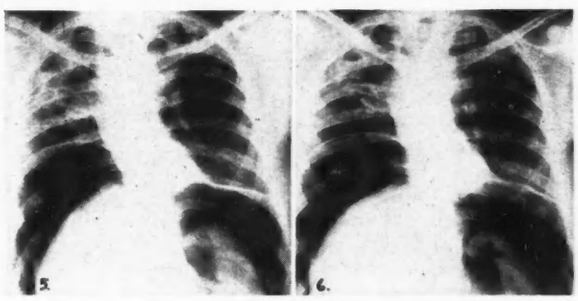


Fig. 5.—Far advanced disease in the right lung with an exudative spread from the upper into the middle and lower lobe. Pneumoperitoneum has had little effect. **Fig. 6.**—Clearing of the exudative spread after a course of streptomycin. The cavity in the right upper lobe has been little effected.

By February 12, 1948, she had received two courses of streptomycin totalling 236 gm. By that time the pharynx and larynx appeared normal, there was only a clean scar remaining of the discharging glands in the left anterior triangle of the neck and there was marked clearing of the nodular shadows in both lung fields. Since the sputum, however, still remained positive for acid-fast bacilli a pneumoperitoneum was begun on March 3, 1948, and the sputum became negative in April, 1948.

At present the patient feels well, has no cough or expectoration, and the lungs are almost completely clear radiologically. Gastric lavages have been negative on smear and culture for the past eight months. The pharynx, epiglottis, and larynx appear normal.

Considering the cases judged to be predominantly fibrotic, there is little radiological change. Surprisingly enough, however, a number of these cases have turned negative after streptomycin therapy. It may be that there was more exudation than met the eye radiologically. We shall have more to say on this point in our analysis of the thoracoplasty failures.

The effect of streptomycin on extra-pulmonary lesions is marked. Lesions affecting the mouth, throat and bronchi respond very well and are shown in Table IV. In these cases, especially with bronchial disease, we have used a combination of aerosol and intramuscular therapy. The response of the lesions has been very gratifying. One of our laryngeal cases needed a second course of therapy for two months due to a relapse after cessation of the first course of treatment. The bronchial cases did not do as well. There was marked initial improvement in all four of the cases treated but two of them relapsed after treatment was stopped and in one of these cases the tubercle bacillus has now become streptomycin resistant.

TABLE IV.

EFFECT ON PHARYNGEAL, LARYNGEAL AND BRONCHIAL TUBERCULOSIS

Oral and pharyngeal		
Markedly improved (permanent)	2	100%
Markedly improved (temporary)	0	
None	0	
Laryngeal		
Markedly improved (permanent)	4	100%
Markedly improved (temporary)	0	
None	0	
Bronchial		
Markedly improved (permanent)	2	50%
Markedly improved (temporary)	2	50%
None	0	

Considering other extra-pulmonary lesions, our experience has not been wide enough to warrant much discussion. Our results are seen in Table V. In general, we see marked rapid

TABLE V.

Lesion	*Cured*	*Improved*	*No change*	*Worse or died*
Disseminate	4	2	1	
Meningeal				2
Kidney and bladder	1	2	2	
Epididymis			2	
Fistula in ano	1	1		
Chest wall sinuses	2		1	
Broncho-pleural fistula				1
Abdominal and other sinuses	1	1		
Gastro-intestinal	1		1	
Lymph glands	1	1	1	
Empyema	1		11	

improvement in most cases but a tendency to relapse after treatment is stopped. Meningeal disease shows this very markedly, as illustrated by the case of one of our patients who was moribund one day and almost well after a few days' treatment but who subsequently relapsed and died. In kidney and bladder tuberculosis our results have been somewhat disappointing in that there has not been a permanent disappearance of tubercle bacilli from the urine in most of our cases. In these cases the streptomycin was used in combination with chaulmoogra oil. It must be acknowledged, however, that there has been marked improvement in the symptoms and that the progress of the disease has been temporarily stayed. The ultimate prognosis with a persistently positive urine is, however, in doubt.

Tuberculous sinuses respond well and quickly to streptomycin unless there is a massive undraining tuberculosis behind them. A large fistula *in ano* responded dramatically. The following is worth recording.

The patient, Mrs. L.W., a 25-year old married white woman, was admitted to the Mt. Sinai Sanatorium in May, 1947, and was found to have moderately advanced pulmonary tuberculosis of the left upper lobe with a positive sputum. She had, as well, a large peri-rectal abscess which had been incised prior to admission. The wound was enlarged after admission to allow better drainage and packing. From May 20, 1947, until July 3 she was treated with quartz lamp therapy and cod liver oil packing of the wound which was large enough to admit a fist. With this therapy there was very little change in the size of the wound and the discharge from this continued positive on smear and culture.

On July 23, 1947, topical administration of streptomycin on the dressings was begun and the patient was also given a gram twice a day intramuscularly.

After two months of this therapy the wound was almost completely closed. In addition, the pulmonary lesion had cleared to a surprising extent and the patient no longer had cough or expectoration. The gastric lavage, however, remained positive for acid-fast bacilli and she was accordingly given another course of streptomycin therapy (one gram a day), from December 11, 1947 to February 11, 1948. Gastric lavages became negative for tubercle bacilli on smear and culture in January, 1948, and have remained negative since.

At present the patient feels well and is at home doing her usual housework. A few small shadows remain in the left upper lung field and have been unchanged for over six months.

We have one patient with a tuberculous peritonitis of the dry type who has a draining sinus in the abdominal wall. This had closed several times with the use of streptomycin, but had eventually re-opened. It now remains closed four months after cessation of therapy.

Tuberculous lymph glands seem to react moderately well to streptomycin. Tuberculous empyema shows very little change with the use of streptomycin intramuscularly and in the pleural cavity but surprisingly enough in one of our patients the purulent fluid became serous and negative to tubercle bacilli and the empyema is apparently cured.

We would like to draw attention to one problem in which we have found streptomycin helpful. All sanatoria are afflicted with a number of cases who have had thoracoplasty operations and who remain sputum positive. These patients are a problem since they feel well, have little sputum and are to all intents and purposes ready to leave the sanatorium but cannot be discharged for fear they will infect members of their families or other contacts. This condition may be maintained for many months or years. We have used streptomycin in some of these cases, with the results shown in Table VI.

TABLE VI.
EFFECT ON THORACOPLASTY FAILURES

Sputum converted to negative	4	57%
Sputum remained positive	3	43%

Just why these patients reacted favourably we cannot say. Streptomycin is supposed to have little effect on fibrotic disease. It may be that there is more exudative disease than we suspect by x-ray or else it may be that there is bronchial tuberculosis of the smaller bronchi beyond the bronchoscopic field of vision and this clears with streptomycin therapy. Whatever the answer, we feel justified in the use of this drug in these cases where the tomogram shows no cavity and the bronchoscope no lesion and yet the sputum remains positive.

One other use is the preoperative use of streptomycin. This is especially true in pneumonectomies or lobectomies, of which we have had several by this time. Thoracoplasties, with the contra-lateral side somewhat active, should also be given the benefit of streptomycin therapy.

CONCLUSIONS

The use of streptomycin is still in its early stages. It is no substitute for other conventional forms of treatment but rather a very useful adjunct to them. The proper selection of cases is still often a matter of trial and error and the proper dosage is still a matter of doubt. In some cases it can be used alone with

dramatic results. Anything from a quarter of a gram to two grams daily seems to be acceptable in many cases. From our own results in 44 cases we feel that the drug has shortened the stay in sanatorium of individual patients by months and even years. It is highly successful in hæmatogenous cases other than meningeal. Its use in exudative disease will lead to a high percentage of good results, (67% in our cases), but it will often have to be combined with collapse measures. As a preoperative and postoperative measure in lobectomies its use is almost imperative, and the same is true in thoracoplasties where there is danger of spread due to some disease on the contra-lateral side. Most extra-pulmonary lesions are benefited to a certain extent, but oral and pharyngeal cases respond exceptionally well.

Even fibrotic pulmonary lesions, as exemplified by our post-thoracoplasty failures, may produce surprisingly good results with the use of this drug.

REFERENCES

1. FELDMAN, W. H. AND HINSHAW, H. C.: *Proc. Staff Meet. Mayo Clin.*, **19**: 593, 1944.
2. *Idem*: *Am. Rev. Tuberc.*, 55, May, 1947.
3. HINSHAW, H. C., FELDMAN, W. H. AND PFUETZE, K. H.: *J. Am. M. Ass.*, **132**: 778, 1946.
4. SCHATZ, G. P. AND WAKSMAN, J. C.: *Proc. Soc. Exper. Biol. & Med.*, **57**: 244, 1944.
5. Various authors: *Am. Rev. Tuberc.*, **56**: November and December, 1947.
6. YOUMANS, G. P. AND KARLSON, A. G.: *Am. Rev. Tuberc.*, 55, June, 1947.

(Numerous other references supplied on request.)

4123 Sherbrooke W., Westmount.

RÉSUMÉ

L'auteur donne les résultats qu'il a obtenu avec l'emploi de la streptomycine dans la tuberculose. Plusieurs principes sont à retenir dans l'usage de ce médicament. Une injection de gm. 0.50 toutes les 12 hres est suffisante pour maintenir un niveau sanguin effectif. Ce n'est qu'au bout de 40 à 60 jours que l'on trouve des cultures de BK streptomycino-résistants. Les resultats sont basés sur 44 cas. L'effet du médicament ne tarde pas à se faire sentir au bout de quelques jours la température descend et l'état général est amélioré. Deux semaines plus tard les premiers signes d'intoxication peuvent se manifester.

Une amélioration sensible fut observée dans 60% des cas choisis. Dans la tbc pulmonaire les résultats, controlés par les RXS, furent excellents dans 67% des lésions exudatives, dans 75% des lésions hématogènes et 12.5% des cas de fibrose malgré que dans ces derniers les crachats soient devenus négatifs à quelques reprises. Dans la tbc bronchique les résultats furent excellents et permanents dans 50% des cas et temporaires dans le reste. Dans la tbc pharyngée et laryngée on obtint 100% de guérisons. L'expérience des auteurs dans les autres localisations de la tbc n'est pas assez étendue pour produire des statistiques. La streptomycine nécessite quand même les interventions chirurgicales et son emploi est essentiel dans les soins pré et post-opératoire des lobectomies et des thoracoplasties pour prévenir la dissémination. YVES PRÉVOST

ARTHRITIS: ITS TREATMENT IN THE HOME*

F. S. Brien, M.B.(Tor.), M.R.C.P.(Lond.), F.R.C.P.[C.]†

London, Ont.

BECAUSE of the great numbers of people who suffer from the various types of arthritis, it is obvious that the family doctor must assume a major rôle in treating these patients. If he is to do this effectively, it is abundantly clear that he must replace his present-day pessimistic attitude towards the arthritides with one of cautious, justifiable optimism, firm in his belief that with accurate diagnosis, and appropriate therapy, alleviation of symptoms will occur in the vast majority of his patients. Organized medicine is taking steps to assist the general practitioner in the handling of arthritis, and at the same time preserve his rights and dignity.

It is not within the scope of this presentation to discuss the differential diagnosis of the many forms of arthritis and related conditions. However, one cannot refrain from repeating that it is of paramount importance to take a complete history, perform a proper physical examination and evaluate the two in terms of the individual as a whole. It is likewise impossible to outline the specific therapy for every type of arthritis. Only the more important and commoner agents, which lend themselves to use in the home, will be discussed at this time.

1. Adequate mental and physical rest are most important, particularly in the active phases of rheumatoid arthritis, acute infectious arthritis, ankylosing spondylitis and rheumatic fever. Whenever possible, it is a good plan to start such therapy in hospital, where it is easier to control the patient. In the majority of cases this will not likely be feasible. Many of these patients show marked constitutional reactions and the duration of bed rest may have to be prolonged for many weeks or months. During this period physical therapy and simple orthopædic measures, carried out in the home, under the direction of the family

* Read at the Eighteth Annual Meeting of the Canadian Medical Association, Section of Medicine, Saskatoon, June 16, 1949.

† Professor of Medicine, University of Western Ontario.

doctor, will prevent ankylosis, contractures and muscle atrophy.

The mattress should be firm and the spring non-sagging; the patient's posture in bed should be carefully supervised. Weight should not be borne on acutely inflamed, hot joints, on limbs with marked muscle atrophy, flexion deformities or poor alignment and all pillows should be discarded for at least part of every day, in order to permit full extension of all joints. If the patient cannot, or will not, go to bed, daily rest periods will do much to keep the patient's morale high.

2. Immobilization of acutely inflamed joints —by splints, or some other appropriate simple appliance—in a position of physiological rest should be carried out. Such splints should be removed at least once daily, and the involved joints put through a full range of painless movement. Relaxation of muscle spasm, relief of pain and prevention of flexion contractures, will result from such procedures. When weight-bearing is resumed, support of the involved joints of the lower extremities with elastic bandages, proper fitting shoes, the aid of a walker (which can be very simply constructed), or crutches, may be very valuable.

3. Aspirin, either alone, or in combination with phenacetin, or phenacetin and caffeine, is usually very effective in relieving joint pain, particularly in rheumatoid arthritis. It is occasionally necessary to add small amounts of codeine in acute cases. Colchicine is valuable in one variety of arthritis only—gout—and in this disease it gives most spectacular results. Gout is on the increase in this country, and should be suspected much more often than is now the case. In recurrent attacks, the early administration of colchicine will frequently abort such attacks. Salicylates are valuable as interval therapy. Penicillin, streptomycin, and the sulfonamides are of little value unless a specific organism can be isolated. Any infection in an arthritic should receive prompt adequate treatment, but the agents mentioned will not benefit rheumatoid arthritis, ankylosing spondylitis or gout.

Gold salts are of value in no rheumatic disease but rheumatoid arthritis. They are potentially toxic and their use requires a thorough understanding of these risks by both patient and doctor. They should definitely not be considered as routine therapy in rheumatoid arthritis. With proper controls and careful selection of cases who have not responded to a thorough trial of more orthodox methods of treatment their use is justified in a small percentage of cases. The availability, and apparent value of BAL, does not lessen, in any way, the need for caution in the use of chrysotherapy. The recent reports of Compound E and its dramatic effects in rheumatoid arthritis are fascinating to read. As this substance becomes increasingly available it well may be that in it may rest the answer to many of the problems that concern us today.

4. The diet in arthritis should be well balanced and nourishing, and the dictates of common sense, with regard to the caloric needs of the individual, the type of arthritis from which he suffers, should be followed. In gout, the rigid restriction of purines is no longer practised by many.

5. Physical medicine constitutes a large and very important part of the home treatment of the arthritic patient. To certain aspects of this I have already alluded. Physical medicine seeks to prevent or lessen deformity, relieve symptoms, and shorten the duration of the illness. It may be carried on at home after being initiated in hospital, or may be instituted for the first time in the home. It is obvious that each case must be individualized.

The physical measures that may be advantageously employed in the home include heat, massage, exercise, occupational therapy, rest, splints, supports, etc. A simple homemade electric baker may be used to provide local heat to the involved joints, and is probably safer than the ordinary electric heating pad. Such a baker should be employed for from 15 to 30 minutes several times a day.

Wax baths afford a very satisfactory method of providing local heat, particularly to the distal portion of an extremity. Ordinary paraffin wax is melted in a suitable container, such as a double boiler, and allowed to cool until a film forms on the surface. At this point the temperature will be tolerated by the skin, and the paraffin may be painted on the affected joint (with an ordinary paint brush), or, in the case of an extremity, it can be dipped into the bath and quickly removed. Ten or twelve coats are applied and the application left on for from 30 minutes to an hour. If the skin over the area being treated is hairy it should be oiled or

shaved before the paraffin is applied. The incorporation of a gauze bandage into the paraffin will aid in the retention of the heat and provides a temporary splint or support for the joint so treated. It should be removed in 24 hours in order that other physiotherapy measures such as exercise and massage may be carried out.

A daily hot tub bath taken in the patient's own bathtub may be of considerable value in stimulating the peripheral circulation, relieving pain and muscle spasm. The temperature of the water should be from 98 to 106° F. (measured with an ordinary bath thermometer) and the duration worked up from three to five minutes to as long as fifteen or twenty minutes. The hot bath is particularly valuable when given as a preliminary to massage and exercise.

A whirlpool bath, useful in the treatment of arthritis in the extremities, may be constructed for home use with relatively little difficulty. The limb to be treated is placed in the whirling aerated water with a temperature of not over 110° F. for a period of one-half to three-quarters of an hour. Great peripheral dilatation and relief of pain accompanies this form of therapy.

Contrast baths are particularly valuable in the handling of arthritis of the hands and feet. This can be carried out very simply in the home with the aid of two deep buckets, one two-thirds filled with water as warm as can be borne comfortably and safely (105 to 110° F.), the other two-thirds filled with cold tap water (50 to 65° F.). The part to be treated is placed in the hot water first, for 10 minutes, then immersed alternately for one minute in the cold water, and four minutes in the hot water. This procedure is carried out for one-half hour once or twice daily. It is important to start and end with immersion in the hot water. By the use of a bath spray attached to a hot and cold water faucet it is possible to treat shoulders, knees and other parts of the body in a similar fashion. Again it is important to commence and end with the hot spray.

Massage is best employed immediately after therapy with heat. It is almost impossible for a patient to massage himself effectively. A member of the family can nearly always be instructed by a physiotherapist, either at the hospital or in the home, in the technique of massage. A few simple strokes and kneading of the muscles in the region of affected joints result in improvement in the circulation and the muscle tone of the part. Massage should be modified if pain is acute or if the skin temperature in the region of the joint rises. It is desirable that careful supervision of this therapy be carried out by the family doctor, or a travelling physiotherapist who might visit the home from time to time.

Therapeutic exercises are usually carried out at the conclusion of massage. They should be carefully graded from passive to active assistive, and ultimately to active voluntary motion. Passive exercises are performed without effort or resistance on the part of the patient, and are particularly useful in preserving movement in acutely inflamed joints. Active assistive exercises result in increased joint motion and strengthened muscles, and are a prelude to active voluntary movements. Arthritic joints can be gently manipulated by means of active assistive exercises, so increasing their range of movement. Active voluntary exercises should be commenced as soon as feasible, and, in the case of the lower limbs, the joints should be exercised in the supine or sitting position before weight bearing is attempted. The feet should receive spécial attention.

Postural exercises may be very useful in helping to balance the body, and distribute the weight evenly and avoid unnecessary strain.

Occupational therapy can be employed to good advantage in the home treatment of arthritis. It will often increase the activity and usefulness of involved joints, and may provide a source of revenue for persons who are unable to resume their former occupation. A stationary bicycle is very useful in exercising the joints of the lower extremity. A foot pedal sewing machine provides useful exercise for the ankle. Clay or plasticine modelling, and the use of various carpenters' tools are of great value in mobilizing the fingers and wrists. Basket making and loom weaving will exercise the elbows, shoulders and upper back. Leatherwork, woodcarving and many other interesting forms of occupational therapy are available for those who will use them. When possible, a visit to an occupational therapy workshop by the patient, or to the patient's home by an occupational therapist is highly desirable, and will pay great dividends.

6. Probably the most useful single laboratory test in the rheumatic group of diseases is the erythrocyte sedimentation rate, and in most cases it is the only test required (apart from

routine urine and blood examinations). With readily available and inexpensive equipment the busy practitioner can draw the blood for these tests on his way to the hospital, where a technician can complete the examinations, if he does not have the facilities or time to carry them out in his own office.

In conclusion, the treatment for patients suffering from arthritis is based upon accurate diagnosis and selection of proper therapeutic agents, designed to treat both the local joint involvement and the general condition of the patient as a whole. Readjustments may have to be made from time to time to suit the progress in each individual case. This follow-up care is just as important as the initial therapy, and wherever possible it is desirable to supplement the home treatment with the services of a trained physiotherapist at least once a week. The patient and his relatives should be made aware of the problem and given definite reassurance but at the same time no false hopes of an early cure in the majority of cases.

BIBLIOGRAPHY

1. COPEMAN, W. S. C.: Textbook of Rheumatic Diseases, Livingstone, Edinburgh, 1948.
2. COMROE, B. I.: Arthritis and Allied Conditions, Lea and Febiger, Philadelphia, 1947.
3. HENCH, P. S. *et al.*: *Ann. Int. Med.*, **28**: 66, 309, 1948.
4. KENDELL, H. W. *et al.*: Collected Papers of the Mayo Clinic and the Mayo Foundation, **39**: 679, 1947.
5. COFFEY, T. H.: Personal communication.

PERIODIC PARALYSIS*

H. H. Hyland, M.D., F.R.C.P.

Toronto, Ont.

THE syndrome of periodic paralysis includes intermittent attacks of flaccid paralysis of the trunk and extremities usually coming on during sleep, with diminution or absence of tendon reflexes and impairment of electrical excitability of muscles and nerves. Consciousness is retained throughout. In a large percentage of cases there is a hereditary and familial incidence of the condition but at least 20% of the cases occur sporadically.

The disease has been recognized for a long time and a case was described by Musgrave in 1727. Cavaré reported a case in 1853, since when there has been increasing interest in the condition. At the turn of the century it was recognized by Singer and Goodbody and by Buzzard that salts containing potassium prevented paralysis. In 1934 Biemond and Daniels observed that there was a depression of the serum potassium during an attack. Other observers in 1937 and 1938, including Aitken and his associates; Allott and McArdle; Pudenz, McIntosh and McEachern, showed that the attacks are associated with a marked fall in serum potassium and that the administration of adequate amounts of potassium salts brings about rapid recovery. Allott and McArdle showed also that during an attack the phosphate usually decreases in the serum accompanying the diminution of potassium. They postulate that the lowering of the inorganic phosphate is intimately related to a disturbance of hexosphosphate metabolism in the muscles.

Although the disease is considered rare, Talbott in his comprehensive review states that 400 cases had been described up to 1938. All nationalities are liable, but it is three times as frequent in males as in females. In its transmission through families it is usually a Mendelian dominant, but occasionally it may skip one or more generations. It becomes manifest in early life as a rule and cases have been described in infants. The commonest age range for it to develop is from 10 to 16 years.

The attacks, which occur characteristically at night during sleep, may last from a few hours to several days. Their frequency varies greatly in individuals. Some patients have attacks daily, whereas others may go months or years between attacks. In the attacks the paralysis commonly starts distally in the lower limbs, then spreads gradually centrally to involve the thighs, arms, trunk and neck. The paralysis may be partial or complete and occasionally it may be localized to involve only two limbs or one-half the body. During an attack the patient is mentally clear and usually able to speak, but if the attack is severe he may be totally incapable of moving any muscles in the trunk or limbs.

Factors which may precipitate an attack include exposure to cold, excessive exercise, prolonged bed rest, emotional excitement and the ingestion of large amounts of carbohydrate. Experimentally it has been found that attacks can be produced by the administration of adrenalin or insulin, and by water diuresis. It appears that when anything acts directly or indirectly favouring mobilization of glucose there will be an associated lowering of the concentra-

* Read before the Annual Meeting of the Royal College of Physicians and Surgeons of Canada, November 26, 1948.

tion of serum potassium, thus tending to cause attacks in susceptible individuals. It has been shown that attacks usually come on when the level of potassium in the serum is 12 mgm. % or less, but in normal individuals both potassium and phosphate leave the serum after insulin, resulting in levels of this degree without attacks of paralysis occurring. Thus there is another factor besides the reduced serum potassium and phosphate which renders patients liable to attacks.

In recent years a good deal of investigative work has been carried out in this disease but to date the etiology of the condition is obscure. It has been regarded as due to an inborn metabolic defect. Potassium ions are essential in the development of potential changes associated with the conduction of nerve impulses, and with the clinical signs of flaccid paralysis, loss of reflexes and electrical excitability during attacks it has seemed that the site of the disturbance must be in the neuromuscular apparatus. However, Pudenz, McIntosh and McEachern carried out experiments which suggest that the chemical defect responsible for the paralysis lies in the central nervous system and not in the muscles. They injected a solution of potassium chloride into the left brachial artery while the venous return was obstructed for eight minutes sufficient to confine the potassium to the limb. There was no recovery of power in the muscles although the amount injected was theoretically sufficient to cause local recovery, since half the amount had caused general improvement when injected intravenously in previous attacks. Again when the arterial supply of one arm was occluded for about fifteen minutes, potassium chloride solution was injected rapidly into the vein of the opposite arm. Power was regained in about five minutes in all limbs and was as rapid in the still occluded limb as in the others. Thus recovery occurred in a limb which was completely isolated from the rest of the body as regards humoral channels. They conclude, therefore, that the defect is neurogenic.

The case to be reported illustrates well the clinical features of the disease.

CASE REPORT

H.L., male, 34, single, Hebrew, was referred in December, 1947, as a case of hysteria. The history was obtained that for eighteen years he had been subject to periodic attacks of weakness of his voluntary muscles manifested on awakening in the morning. These occurred once or twice monthly and usually passed off after about three hours until about three months previously when the attacks became frequent and severe, tending to last from six to twelve hours. During the six weeks prior to admission the attacks occurred almost daily and as a consequence he had remained in bed constantly. The patient stated that in other respects his health had been good. Since the condition practically always developed in the early morning hours and as the patient had a great fear of his attacks of weakness, he would be tense and anxious on retiring to bed and was liable to lie awake for hours.

When first seen he was not suffering from any weakness and general physical and neurological examinations revealed nothing of significance. He was a well developed, well nourished individual who was mentally quite dull so that it was difficult to get an adequate history from him. He was very anxious and concerned about his condition but otherwise there was nothing remarkable about his emotional state. He stated that for the first time in his life he had become extremely attached to a girl in the past four months and that until recently when he was totally incapacitated he had been

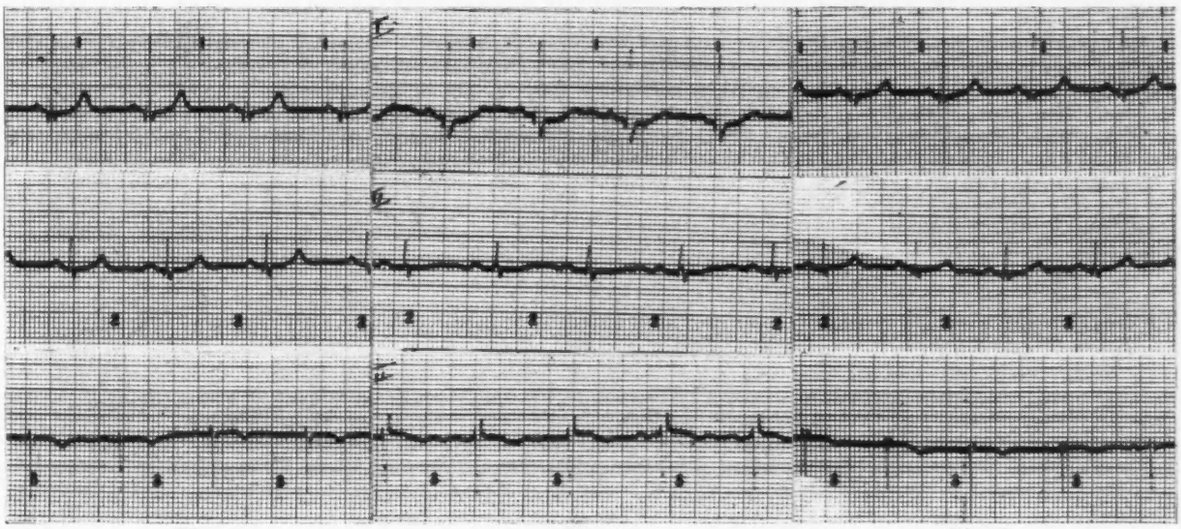


Fig. 1 Fig. 2 Fig. 3

Fig. 1.—Before attack. Normal electrocardiogram. **Fig. 2.**—During an attack. Note depression of T-waves in all leads and depression of ST segment below the base line. **Fig. 3.**—Ninety minutes after receiving KCl, 16 grams per os. Normal electrocardiogram.

seeing her regularly. Because of his difficulty in sleeping the patient admitted that he had been taking a considerable amount of alcohol, mainly in the form of beer, in recent months. It had become his practice to drink a considerable quantity each night before retiring to bed.

The patient is one of a family of eight children, all of whom are perfectly healthy. He did not get along well at school and since the age of 15 had been working as a truck driver. He was in the army in Canada for several years during the war and apparently his attacks of weakness, which occurred occasionally in the morning, preventing him from arising at the usual hour, were tolerated and he was not subjected to any investigation. He was evidently in a low category and was employed mainly as a batman. His diagnosis on discharge from the army was pes planus, hallux valgus and mental retardation.

During the first two days in hospital the patient showed no evidence of weakness, but on the third morning he awakened in an attack. Examination showed him lying in bed, mentally clear and able to talk. He was unable to lift his arms or to move his legs around the bed although there was a little feeble movement present in all muscle groups. He could not sit up or raise his head from the pillow. There was no evident weakness of the facial or ocular muscles on voluntary movement. The tone of the muscles of the limbs was flaccid and the tendon reflexes, which were all present, were difficult to elicit. The plantars were flexor and there was no sensory impairment. The patient had to be fed his breakfast and his midday meal, but late in the afternoon the power in the muscles returned gradually and he was able to eat his evening meal without tssistance. During the attack his blood was taken for a potassium estimation and revealed a level of 7 mgm. %.

The following morning the patient showed no evidence of weakness in any muscle group. Tendon reflexes were all active, in marked contrast to what they had been during his attack. The serum potassium was 18.9 mgm. % and serum phosphate 3.7 mgm. %. During the next two days the patient had no further attacks of weakness and it was decided to induce an attack. Accordingly the patient was given 250 gm. of glucose at 9 p.m. At 3.20 in the morning the muscular weakness commenced and when he was examined at 8.30 in the morning the weakness was even more profound than had been previously observed. On this occasion the reflexes in the arms could not be elicited, the ankle jerks were absent and the knee jerks were barely elicitable. He could move his fingers slightly but elsewhere in the upper limbs there was no power. Some slight movement was present in the left leg but practically none in the right. The potassium estimation was 7.4 mgm. %, phosphorus 3.4 mgm. %. The patient remained in this condition and at 10 o'clock he was given 5 grams of potassium chloride. By 11 o'clock there was evidence of return in power of his voluntary muscles and by 12 o'clock power had returned completely so that he was able to walk briskly and use his arms satisfactorily. The return in reflex activity corresponded to the return in power, the right ankle jerk being the last to return. Before the potassium chloride was administered an electrocardiogram was done which showed the characteristic changes found during attacks of periodic paralysis, contrasting with his normal electrocardiogram before the attack and following recovery (see Fig. 1, 2 and 3). The T-waves were decidedly depressed in all leads and there was depression of the ST segment below the base line. The serum potassium done 2½ hours after the previous estimation when he had recovered from his attack was 24.8 mgm. %. The patient had electroencephalograms done both in his normal state and at the height of an attack. No abnormality was detected in either recording. This finding of a normal electroencephalogram at the height of an attack is in keeping with the observation of Watson and indicates that no change occurs in the cerebral cells during an attack which can be demonstrated by this method of investigation.

The observations, clinical and laboratory, recorded above point conclusively to a diagnosis of periodic paralysis. The case is a sporadic one, there being no history of the disease obtainable in his family or forebears. The increase of symptoms during the months before he came under observation may have been due in part to emotional excitement associated with his love affair. The only attack which this man had coming on other than during sleep occurred one evening when he was returning from a visit to his girl friend. He became so weak that he was unable to unlock the door of his house and collapsed on the front steps. With the increasing frequency of attacks his fear of awakening paralyzed became accentuated and he experienced increasing tension at night with resulting insomnia. The large consumption of alcoholic beverages in the evenings to induce sleep may also have contributed to increase the symptoms because of the carbohydrate content.

In treatment he was instructed to discontinue alcohol entirely and to curtail his intake of carbohydrates which had always been high. He was given a sedative each night to aid him in sleeping. Potassium chloride in the form of enteric coated tablets was prescribed and the optimum dosage in this case was found to be grams 4 q.a.m. and q.h.s.

The patient has remained free of symptoms under treatment. He soon found that he was able to sleep well without sedative, supporting the view that in large part the insomnia was due to fear of attacks of paralysis. He married and apparently is making a good adjustment now at his work and in his domestic life. Seen recently he appeared brighter and more alert than was the case when he first came under observation, which may be simply a result of his improved emotional state.

SUMMARY

A brief review of the clinical and metabolic aspects of the syndrome known as periodic paralysis is reported.

The observations on a sporadic case are reported.

BIBLIOGRAPHY

1. AITKEN, R. S., ALLOTT, E. N., CASTLEDEN, L. I. M. AND WALKER, M.: *Clin. Sc.*, **3**: 47, 1937.
2. ALLOTT, E. N. AND MCARDLE, B.: *Clin. Sc.*, **3**: 229, 1937.
3. JOHNSON, J. W. JR.: *War Med.*, **7**: 382, 1945.
4. OLIVER, C. P., ZEIGLER, M. R. AND MCQUARRIE, I.: *Am. J. Dis. Child.*, **68**: 308, 1944.
5. PUDENZ, R. H., MCINTOSH, J. F., MCEACHERN, D.: *J. Am. M. Ass.*, **111**: 2253, 1938.
6. TALBOTT, J. H.: *Medicine*, **20**: 85, 1941.
7. WATSON, C. W.: *Yale J. Biol. & Med.*, **19**: 127, 1946.

604 Medical Arts Bldg.

SOME THOUGHTS ON INFANTILE ECZEMA*

Arthur R. Birt, M.D.

Winnipeg, Man.

INFANTILE eczema presents more unsolved problems than any other common skin condition of early life. It is a simple matter to make a diagnosis of infantile eczema, but it is very difficult to find the exact cause of its various phases and to prescribe satisfactory treatment. Many theories have been advanced concerning it, and none is completely adequate.

Eczema is generally regarded as being a method of reaction of the skin and not as a disease entity. It has been shown that allergens or irritants reach the skin by direct contact, ingestion or inhalation. Irrespective of the route of approach, they may produce a similar clinical response in the skin, known as eczema. It is characterized by the presence of two or more of the following: erythema, papules, vesicles with oozing, crusts, scales and thickening. This type of reaction, when it is found in infancy, is usually most marked on the face and is called infantile eczema. Hill[1] recognized that the term infantile eczema was being used as a diagnosis for several closely related conditions and he suggested that it be divided into the following four groups: (1) seborrhœic dermatitis; (2) eczematous fungous conditions; (3) contact dermatitis; (4) atopic dermatitis. Seborrhœic dermatitis in infants usually starts on the scalp (cradle-cap), and is often found in association with the other types of eczema. It may be recognized by the scalp involvement and the presence of more or less circinate areas of dermatitis covered with light brown, greasy scales. The reason for the occurrence of seborrhœic dermatitis and "cradle-cap" in infants is unexplained at the moment. In view of the recent writings of Barber[2] it is interesting to speculate as to the part played by the male gonad and adrenal cortex in its production, and as to the rôle assumed by the pityrosporum of Malassez and other organisms in this dermatitis of infancy. The group of eczematous fungous conditions affecting infants is not common in Canada and will not be considered here.

To differentiate clinically between the contact and atopic types of infantile eczema is almost impossible. Occasionally the distribution of the lesions on the body is helpful, but usually the diagnosis has to be made by other means. Contact dermatitis may be due to hypersensitivity of the epidermis to any one of innumerable irritants, which act in concentrations that would not produce reactions in the absence of allergic sensitivity. It may be produced also by substances that act as primary irritants and which are not dependent for their action on any demonstrable allergic response. The principal seat of reaction in contact dermatitis is in the superficial epithelial portion of the skin.

Many writers, including Hill,[1, 3] Sulzberger,[4] and Ditkowsky *et al.*,[5] express the opinion that the large majority of cases of infantile eczema are of the atopic type and that contact dermatitis is relatively uncommon in infancy. By atopy is meant a special and particular form of allergy in which there is a predisposition, usually determined by heredity, to develop certain diseases, the commonest being infantile eczema, disseminate neurodermatitis, asthma and hay fever. Atopy is characterized by the presence of circulating antibodies that can be demonstrated by the passive transfer method of Prausnitz and Kustner; by immediate positive wheal reactions to scratch and intracutaneous tests with the offending allergens; and by eosinophilia. In atopic dermatitis it is thought that the hypersensitivity to protein or protein-like allergens is in the deeper layers of the skin (*cutis vera*).

The significance of immediate positive wheal reactions to scratch or intracutaneous tests in infantile eczema has been the subject of much discussion. Hill and Sulzberger[6] reported that about 85% of all infants under one year of age who react to anything, react to egg. Ratner[7] found positive skin reactions in 85% of his cases under one year of age; 100% of these positive reactors were sensitive to foods, but only 41% reacted to foods alone. Ditkowsky[5] states that a positive reaction to egg white is such a common finding that it can be used as an indicator for the presence of atopy in infants. Hill[8] has recently pointed out that the reactions to egg white, and other allergens develop about the third month of life and first become manifest about the same time that the eczema appears. The causal relationship of the positive egg white

* Presented at the Annual Meeting of the Canadian Dermatological Association in Winnipeg, June 13, 1949.

From the Department of Dermatology, University of Manitoba.

test to the dermatitis is difficult to establish as it occurs in infants who have never had and are not eating egg. It is true that Ratner[9] has demonstrated that the placenta is permeable to protein allergens and that sensitization can occur *in utero*. It is thought also that some allergens, such as egg white fractions can be transmitted to the suckling baby by way of the mother's milk. However, this is an unlikely method of production of the eruption as eczema is much commoner in bottle fed babies. It is also difficult to understand why the skin tests do not become positive until the third month, if sensitization occurs *in utero*. The argument that the newborn infant's skin lacks the power to form wheals was dispelled by the ability of Sulzberger and Baer[10] to produce whealing by the use of histamine phosphate and codeine sulphate in the newborn.

Cooke[11] considers contact and atopic eczema to be immunologically identical and suggests that patch tests and clinical tests by exposure to the antigen are the only methods available today for etiological diagnosis. He states that "those skin sensitizing antibodies of the wheal reaction, circulating in the blood of eczematous infants are a portent of things to come in the way of future asthma and hay fever; they do not necessarily indicate any existing clinical sensitivity and never an eczematous one". Ratner,[7] too, takes, the attitude that contact dermatitis and atopic eczema are mediated by the same mechanism and should be designated as allergic dermatitis, to be studied on the basis of antigen-antibody interactions. He thinks that they differ only in the mode of sensitization, so-called atopic eczema usually resulting from intrinsic contact with antigens and contact dermatitis from extrinsic contact. Considering these diverse opinions, it becomes evident that skin testing in infantile eczema is of more scientific than practical value. Its main function at the moment would appear to be as an indicator of atopy.

It is well known that infantile eczema occurs most often in the large, fat-looking, so-called hydro-labile babies. They usually develop the eruption after the third month of life, and tend to get better spontaneously about the age of one year. This corresponds to the time when the infant is growing most rapidly and to the period when the largest portion of the diet is liquid. It has also been shown that with fever and sudden weight loss associated with illness, infantile eczema may improve. Kern,[12] in a most interesting article, has theorized that changes in water balance may influence the occurrence of allergic phenomena. He postulates that in addition to the local allergenically produced œdema in the shock organ, any one of several causes of water retention in the body may be a factor in producing allergic reactions. If water retention in babies could be reduced by the administration of drugs, such as hydrochloric acid, or if the infant could be fed on a diet restricted in salt and water, it might be possible to control many cases of eczema without resorting to other therapies. This goal might also be achieved if pædiatricians would feed young infants with smaller amounts of milk. In our opinion, if infants receive adequate amounts of carbohydrates, fats, proteins, minerals and vitamins in an easily assimilable form, there is no reason why they should receive milk. Unfortunately, at the moment, we have been unable to find any generally acceptable milk substitute.

Hansen[13] believes that essential fatty acids are required for the maintenance of the normal integrity of the skin. He has demonstrated that in infantile eczema, the blood serum fatty acids tend to be less saturated than in normal infants, as shown by a low iodine number. Administration of fats such as linseed oil and lard, which are rich in unsaturated fatty acids, lead to clinical improvement of the eczema and to an increase in the iodine numbers of the serum fatty acids. The same effect can be produced by the local application of crude coal tar ointment. Hansen thinks that other factors may be influential in the actual development of the dermatitis. Stoesser[14] suggests that the infants who have low iodine numbers are those with the atopic form of eczema. It would appear that the feeding of unsaturated fatty acids does not obviate the necessity of eliminating irritants and allergens, and should be used in conjunction with proper local therapy and diet supervision.

The preceding discussion expresses only a portion of the theories and facts that are advanced concerning infantile eczema. The ultimate solution of the problem will probably incorporate some of them. In the meantime, however, it is desirable to have a practical approach to the patient that will yield as high a

percentage of good results as possible. At the Children's Hospital of Winnipeg the following plan is used. On the first visit the lesions are carefully examined and a detailed history is taken. If seborrhœa capitis is present or if brownish scaliness is a feature of the lesions, active therapy is instituted at once. Washing the scalp with a mild soap and applying an ointment containing resorcin, 10 grains to the ounce of vaseline, will usually remove the cradle cap. The other lesions are treated with ichthyol or mild mercurial ointments. The use of oil locally is contraindicated. Seborrhœic lesions respond to this type of therapy and a favourable response helps to confirm the diagnosis. History is still most important as a diagnostic weapon of the allergic state. In taking it, particular attention is paid to all contact factors; to dietary additions. and to food dislikes. Small infants often dislike foods to which they have an allergy, though this is not an invariable rule. The family history is thought to be significant only if there is evidence of a considerable quantity of allergic reactions in closely related members of the family. It would seem, that in the majority of cases, it is wishful thinking to expect an intelligent answer to such questions as the incidence of infantile eczema in grandparents, uncles and aunts and this is particularly true if the patient's family has lived in our country for less than a generation. Skin tests are not being used as a routine in our clinic.

If the history contains a definite lead regarding possible contact or food allergens, they are excluded from the environment or diet at once. If the history is essentially negative then all cases are treated as if they are of contact origin until proved otherwise. In our experience the common contact irritants are combinations of soap, wool and cold. We believe that soap and wool, acting as primary and mechanical irritants, are very common causes of infantile eczema. This is particularly true in the winter, when the skin tends to become dry and chapped. Soap should not be used in any form on these infants, and care must be taken to use mild laundry soaps on the clothing. The use of strong flake soaps and bleaches on infants' clothes is very apt to precipitate or aggravate a dermatitis, especially if the infant perspires or becomes wet. Vegetable or mineral oil may be used to cleanse the baby and then should be rinsed off with water. The local use of baby oils, prepared by pharmaceutical companies, is contraindicated. They usually contain hydroxy quinoline as a preservative and it is a very common cause of contact type dermatitis in infants. It produces an allergic response rather than acting as a primary irritant.

At the first visit then, the mother is advised to keep soap and wool and baby oils off the infant's skin and a suitable local therapy is prescribed. Various antihistamine preparations have been tried without any constant benefit. Occasionally their oral administration seems to reduce irritability. It is probable that this is due as much to the sedative property of the drugs as to their other action. Local use of antihistaminics is apt to be more irritating than helpful. If possible it is desirable that treatment be given at home, thereby keeping all other factors constant. It is not justifiable to expose an otherwise well baby to the risk of infection in hospital. This procedure is followed for two or three weeks, with weekly observations to be sure that the local therapy is not irritating. In our experience, at least half the babies with infantile eczema are cured on this routine. We consider them to be cases of contact dermatitis and believe that primary irritants are a more important cause of this dermatitis than those contact allergens which are dependent on an antibody response for their effect. Skin tests have not been done on these patients, but it is difficult to understand what significance a positive wheal to a scratch or intracutaneous test would have, considering the results obtained.

If there is no improvement after two or three weeks of adequate local therapy, plus restriction of contact factors then the dermatitis is probably atopic in origin and an attempt is made to find the cause. Atopic dermatitis in infancy is usually due to ingested allergens and the best method of searching for the cause is by the use of elimination diets. It is desirable that the elimination diets used in infancy should vary with the age of the child, and that they should contain foods readily available in the community, at a reasonable cost. The diets used in our clinic have been published previously.[15, 16]

Because we have been unable to find an adequate milk substitute, all babies under two years of age are given evaporated milk, either acidified or plain, in their first elimination diet. The diet

is prescribed for two weeks and is combined with the routine used for the contact cases. It is important that elimination diets be kept properly balanced to meet not only the child's caloric requirements of carbohydrates, fats and proteins, but also to supply adequate amounts of minerals and vitamins. When milk is excluded from the diet, unflavoured calcium diphosphate is given; when citrous fruits are not tolerated cevitamic acid is substituted; and when cod liver oil or its extracts causes a reaction, crystalline vitamin D in the form of drisdol is used. These diets are usually followed quite easily at home. However, it is futile to attempt the use of elimination diets without the full cooperation of all concerned.

If the infant improves while on the diet, and the tendency to scratch diminishes, then he is sensitive to food allergens. If the baby does not improve then, he is either sensitive to the evaporated milk or to some other article of food in the diet, or to some other contact factor, and the search is made in that direction. It is only then that we try unpalatable milk substitutes, such as those made of soya bean. Food additions are made one at a time and the appearance of the skin and tendency to scratch are observed closely as they give the best evidence of an allergic response. Milk and wheat are added first at weekly intervals, and then the other foods at three- to four-day intervals. Tomato and orange are amongst the last additions; egg and egg-containing foods are tried last.

Elimination diets are most helpful for the diagnosis and treatment of the atopic type of infantile eczema. With reasonable care they are quite safe to use. However, if for any reason, a child is losing much weight or is failing to mature on an elimination diet, it should be stopped at once. The dictum that it is better to have a healthy baby with eczema than a sick baby with a clear skin should always be observed.

The principles underlying the use of elimination diets would seem to have a broader application in the field of preventive pædiatrics. There is a tendency today to add a great variety of foods to the diets of small infants. Often these additions contain several components and if the child develops an allergic response, it becomes more difficult to establish the cause. Considering the large number of children who develop manifestations of food allergy, I believe that food additions should be made slowly to the dietary of all infants. When new foods are given, they should be given as individual foods, not as mixtures; and the initial servings should be small. If this method were adhered to many cases of infantile eczema could be prevented.

REFERENCES

1. HILL, L. W.: *J. Am. M. Ass.*, **111**: 2113, 1938.
2. BARBER, H. W.: Recent Trends in Dermatology, Butterworth Med. Publication, London, 1st series, 1948.
3. HILL, L. W.: *J. Pædiat.*, **20**: 537, 1942.
4. SULZBERGER, M. B.: *J. Am. M. Ass.*, **112**: 38, 1939.
5. DITKOWSKY, S. E., HECHT, R., COLE, A. G. AND LEVIN, B.: *Arch. Dermat. & Syph.*, **43**: 258, 1943.
6. HILL, L. W. AND SULZBERGER, M. B.: *Arch. Dermat. & Syph.*, **32**: 451, 1935.
7. RATNER, B.: *New York State J. Med.*, **48**: 296, 1948.
8. HILL, L. W.: *J. Allergy*, **18**: 181, 1947.
9. RATNER, B.: *J. Am. M. Ass.*, **111**: 2345, 1938.
10. SULZBERGER, M. B. AND BAER, R.: *Arch. Dermat. & Syph.*, **41**: 1029, 1940.
11. COOKE, R. A.: *J. Allergy*, **15**: 203, 1944.
12. KERN, R. A.: *Am. J. M. Sc.*, **199**: 778, 1940.
13. HANSEN, A. E., KNOTT, E. M., WIESE, H. F., SHAPERMAN, E. AND MCQUARRIE, I.: *Am. J. Dis. Child.*, **73**: 1, 1947.
14. STOESSER, A. V.: Discussion Hansen's Paper, *Am. J. Dis. Child.*, **73**: 1, 1947.
15. BIRT, A. R.: *Canad. M. A. J.*, **43**: 520, 1940.
16. *Idem*: *Manit. Med. Rev.*, **25**: 481, 1945.

Medical Arts Bldg.

RÉSUMÉ

L'auteur expose les difficultés que présente le problème de l'eczéma infantile. Il divise cette condition en 1—dermite séborrhéique 2—états eczémateux produits par des champignons 3—dermite de contact 4—dermite atopique. La première est facilement reconnaissable, les deuxièmes sont très rares au Canada, les deux dernières se différencient mal cliniquement.

L'auteur passe ensuite en revue les différentes théories et hypothèses qui tentent d'expliquer les dermites de contact et les dermites atopiques. La dermite de contact peut être causée par une hypersensibilité de l'épiderme à des irritants. Les lésions sont situées dans la partie épithéliale superficielle de la peau. La dermite atopique est caractérisée par la présence d'anticorps dans le sang et par des réactions cutanées positives immédiates aux épreuves intradermiques et de scarification. Ici les lésions sont localisées à la couche profonde de la peau. D'autres auteurs soutiennent que ces deux dermites ont un mécanisme de base semblable et que la seule différence réside dans le contact intrinsèque avec l'antigène. Certains insistent sur le fait les eczémas surviennent surtout chez les gros bébés "hydro-labiles" dans leur première année lorsque la croissance est la plus rapide. D'autres disent qu'il s'agit d'un trouble du métabolisme des acides gras; ceux-ci étant moins saturés chez ces patients. Le traitement suivant est employé par l'auteur. Dans la séborrhée, le lavage au savon doux et des applications de résorcine. Les dermites allergiques sont traitées comme des dermites de contact jusqu'à preuve du contraire, i.e. par des soins d'hygiène et l'exclusion des irritants ordinaires, le savon, la laine et le froid. Si aucune amélioration ne s'est produite au bout de trois semaines la dermite est probablement d'origine atopique et la cause en est recherchée. La plupart du temps elle est d'origine alimentaire et une dite d'élimination servira à la trouver.

YVES PRÉVOST

Working with rabbits, and other laboratory animals as controls, it was found that acute anoxia, sufficient in degree, produces a marked diversion of the renal cortical blood flow in the innervated, but not in the denervated kidney. The renal effects were observed either with both kidneys made visible by laparotomy, or with one or both kidneys exteriorized.—Franklin, K. J. and others: *Proc. Soc. Exper. Biol. & Med.*, **71**: 339, 1949.

REGIONAL ENTERITIS*

J. D. Mills, M.D. and E. W. Barootes, M.D.

Toronto, Ont.

SINCE Crohn first described regional ileitis in 1932, many cases have been reported and so much has been written about Crohn's disease, that one hesitates to present anything more about a condition which has been so well described. A most excellent description of the pathology and etiology, together with a presentation of cases, has been prepared by Lyall.[5] The authors, however, think it worth while to briefly present the following case histories.

The etiology is uncertain. Suffice it to say that the condition is an inflammatory lesion, for which no causative organism has, so far, been found, and which may affect any part of the small or large gut except the duodenum. Such wide distribution will be demonstrated by the cases to be presented.

Undoubtedly some cases of Crohn's disease discovered at laparotomy undertaken in mistaken diagnosis for acute appendicitis, which the earliest stage mimics in every detail, must go on to complete resolution and healing without complication, for the patients are never heard from or seen again. On the other hand an undetermined proportion of cases advance to the chronic stages, evidenced by the formation of granuloma, with or without fistula to the neighbouring viscera or to the skin, and secondly to the fibro-stenotic stage with obstructive symptoms, and with marked constitutional manifestations. It is at these stages that the disease becomes a problem for surgical treatment.

Two schools of practice exist in the surgical treatment of this disease. The first group is satisfied to perform short-circuiting procedures on the assumption that defunction of the affected segment will not only alleviate symptoms with a minimum of surgical risk, but will also result in healing of the lesions in the rested bowel. The second, to which the senior author adheres, maintains that resection of the diseased intestine well beyond the limits of the lesion is the best means of achieving cure. Radical treatment should prevent spread to unaffected segments and preclude the late obstructive and fistulous sequelæ. Surgical extirpation in multiple stages is sometimes necessary if several "skip" areas are present, as the patient's general and nutritional condition will not always permit too extensive a procedure at one operation.

CASE 1

J.L., male, aged 24, enlisted in the army in 1942, weighing 138 lb. For a few months prior to enlistment he had experienced some mild abdominal cramps, which disappeared on dietary treatment.

In January, 1943, an episode of cramps and vomiting required three weeks' hospitalization. Examination of his gastro-intestinal tract by barium meal was negative. A similar five weeks' episode occurred in February, 1944, with negative findings, and resulted in discharge from the Service with a diagnosis of psychoneurosis. In September, 1944, the same symptoms returned with diarrhœa. By December the cramps, diarrhœa and vomiting were almost continuous, and the pale, thin patient, weighing 112 lb. was admitted to another hospital. On examination the slightly distended abdomen revealed generalized tenderness. Hb. 70%, white blood cells 13,000. Stools showed occult blood. The gastro-intestinal series, barium enema and gastric analysis were negative. On sigmoidoscopic examination an overgrowth of œdematous friable tissue, strongly suggestive of carcinoma, was found at the rectosigmoid. Biopsy of this was repeatedly negative for evidence of malignancy, showing only chronic inflammation. The bowel above this lesion was normal.

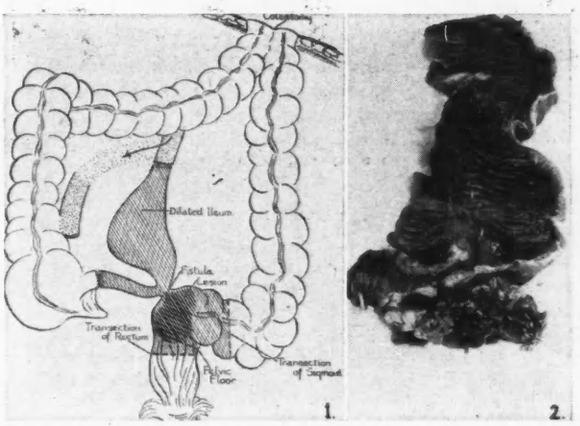


Fig. 1. (Case 1).—Diagram showing pathology and operative procedure. **Fig. 2.** (Case 1).—Specimen removed with probe passing from widely dilated ileum through fistula, into sigmoid colon.

On January 20, 1945, he was transferred to Christie Street Hospital, and after consideration a defunctioning left transverse colostomy was performed on March 12. In about a month it became apparent that an ileo-sigmoid fistula had formed for the patient was passing fæces per rectum and this was confirmed by a barium enema.

After extensive preparation, operation was carried out on May 18, 3½ years after onset of first symptoms, at which time the patient's weight was 98 lb. The lesion in the sigmoid was slightly distal to the recto-sigmoid and extended below the peritoneal fold. The terminal ileum, at a point 8 inches from the ileocæcal junction was firmly adherent to the involved sigmoid, and was obstructed at this site. For a distance of a foot proximal to this point, the ileum was immensely dilated, thickened and œdematous. Resection of both the ileal and sigmoid lesions was apparently necessary and was accomplished in the following manner (see Figs. 1 and 2): (1) The terminal ileum was transected three inches from the ileo-cæcal valve where it appeared grossly normal and the stump was oversewn. (2) The proximal

* This paper was in part presented by Dr. Mills to the Clinical Surgeons of Canada at their Annual Meeting of 1948 in Toronto.

1½ feet of ileum was then resected to a point where bowel appeared normal and the proximal end of ileum was anastomosed, side-to-side, with the ascending colon. (3) The recto-sigmoid was completely mobilized to the tip of the coccyx and an anterior resection of the affected rectum was performed well beyond the lesion. An end-to-end anastomosis of sigmoid to rectum was followed by fashioning a new pelvic floor.

The pathologist's diagnosis was regional enteritis with ileo-rectal fistula, involving terminal ileum and recto-sigmoid. Postoperative recovery was uneventful. Patient was discharged, weighing 135 lb. in July, with a functioning transverse colostomy. The colostomy was subsequently closed.

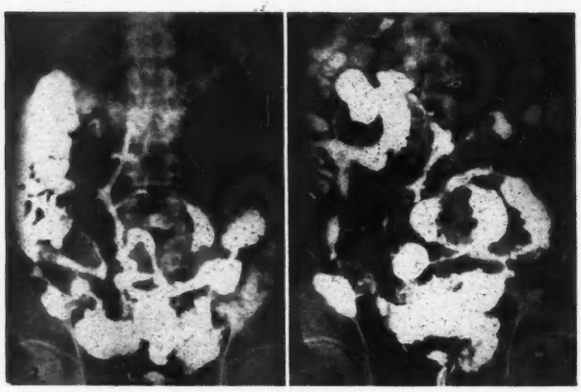


Fig. 3. (Case 2).—Small bowel enema showing typical lesion of Crohn's disease. **Fig. 4.** (Case 2).—Small bowel study. Note extent of disease, typical "string sign of Kantor" and short dilated segments.

CASE 2

H.T., male, aged 28. This patient's first symptoms occurred in October, 1946, when he developed painless diarrhœa, consisting of 2 or 3 stools per day. In the subsequent six months his diarrhœa became more frequent, 5 to 10 stools daily, with occasional tarry stools, lasting for periods of 5 to 10 days, with alternating 3 or 4 day periods of constipation. This was accompanied by crampy peri-umbilical pain which gradually spread over the whole abdomen. X-rays at this time were essentially negative. In the ensuing year leading up to his admission of March, 1949, symptoms became more severe. He lost 23 lb. in weight and was unable to work.

On admission, his general nutrition was fair. His abdomen was soft, flat, with peri-umbilical tenderness. Stool examination was negative. Sedimentation rate 40 mm. per hour; Hb. 88%; white blood count 7,800. A barium enema was negative. A small bowel enema demonstrated typical widespread lesions of advanced Crohn's disease extending from upper jejunum to terminal ileum with no "skip" areas of appreciable length (see Figs. 3 and 4).

At operation all of the jejunum and ileum, except the proximal 4½ feet of the jejunum was considered to be involved. However, the normal intestine was threaded on a Harris tube so that its exact length was difficult to estimate. All of the affected small intestine except the terminal 3 inches of the ileum was resected. It was the surgeon's judgment that right hemicolectomy in addition to the above resection would probably endanger the patient's life. Consequently the distal end of the terminal ileum was brought out through a short grid-iron incision in the right lower quadrant. The proximal jejunum was anastomosed to the transverse colon. An uneventful recovery followed.

This patient has gained 14 lb. in weight, eats a normal diet and has returned to regular work. Further surgery is not being considered at time of writing. The open end of the ileum in the right lower quadrant discharges only a small amount of mucus, requiring one dressing daily. Follow-up barium studies show no abnormality in the remaining intestine, which is so short that it occupies only the left half of the abdomen.

CASE 3

J.T., male, aged 24, enlisted in the Navy in 1942, at which time he weighed 160 lb. In June, 1943, he developed weekly episodes of flatulence, crampy lower abdominal pain and diarrhœa, lasting two to three days. During the next year and a half, repeat barium enemas and barium meals with follow-through were negative.

In November, 1944, because of severe and continuous symptoms, he was admitted to the Naval Hospital in Halifax, where x-ray studies of the abdomen showed evidence of partial small bowel obstruction. He was pale, under-nourished and had lost 20 lb. Hyperperistalsis was observed in the distended, tender abdomen. Two weeks of conservative treatment failed. At operation the proximal three feet of jejunum and terminal ileum were normal. The remainder of jejunum and proximal two-thirds of ileum was thick, boggy, and diffusely reddened with alternating areas of constriction and dilatation. Jejuno-ileostomy was performed, short-circuiting five feet of markedly affected small intestine.

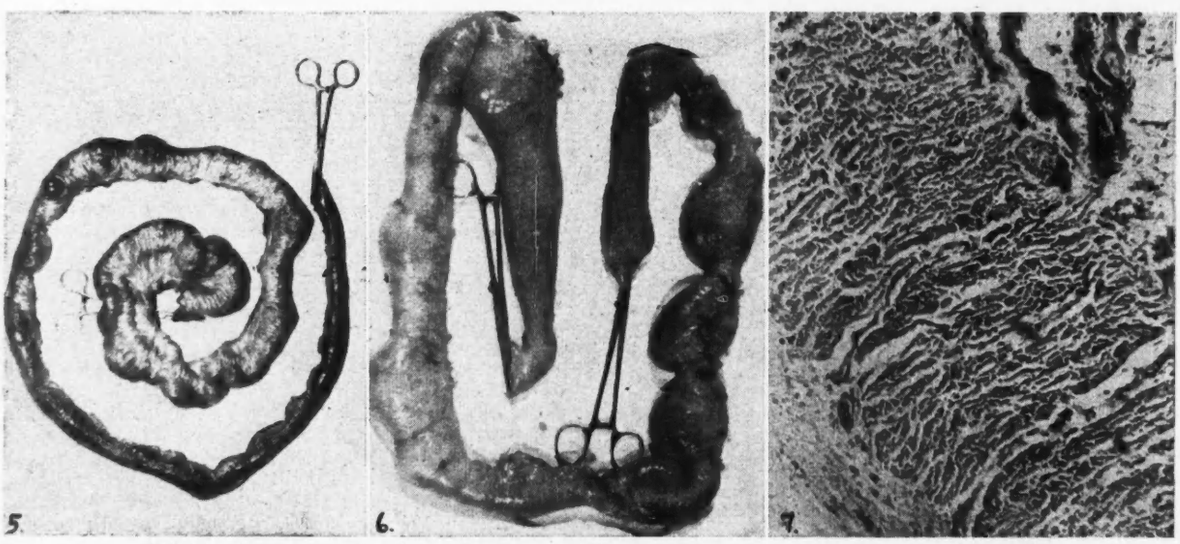


Fig. 5. (Case 2).—Specimen removed. **Fig. 6.** (Case 3).—Specimen removed. **Fig. 7.** (Case 3).—Photomicrograph of wall of removed bowel.

Two months later he was discharged, improved. He was gaining weight,—cramps and diarrhœa had subsided, but a few mild gas pains still persisted. By April, 1945, the cramps and diarrhœa had returned. In September, 1945, he was admitted to Christie Street Hospital with severe, continuous cramps, diarrhœa and flatulence. In addition he had general malaise, fatigue, night sweats, nausea, periodic vomiting and swelling of his ankles. He weighed only 105 lb. on admission,—a loss of 55 pounds. The clubbing of the cold extremities and pitting œdema with left foot drop were classical signs of the patient's nutritional œdema and peripheral neuritis. The abdomen showed some distension and generalized tenderness. Hb. 58%, white blood cells 5,000. Sedimentation rate 25 mm. per hour. Serum protein 4.8 gm. %. Stools contained traces of occult blood. A flat abdominal plate showed multiple fluid levels in small bowel and barium pooled in the intestines.

Intensive supportive measures failed to improve the patient. He continued feverish and his weight dropped to 95 lb.

In November, 1945, operation was performed, and the five feet of short-circuited small bowel were removed. The intestine removed showed alternating areas of constriction and dilatation (see Fig. 6). The remainder of the small bowel was grossly normal. The pathological diagnosis was "typical regional enteritis in the fibro-stenotic stage".

In the first ten postoperative weeks the patient gained 43 lb. The foot-drop and nutritional œdema disappeared and the blood proteins returned to normal. He has been working regularly since discharge, and returns for recheck occasionally. Today he weighs over 160 lb., feels well and has 2 or 3 formed bowel movements daily. The clubbed fingers and toes have disappeared, and his blood chemistry is entirely normal. Repeated gastro-intestinal barium series and follow-through show no small or large bowel disease.

CASE 4

Miss L., enlisted in the army in February, 1943, at the age of 24, in good health, and weighing 110 lb. In December, 1945, she developed crampy lower abdominal pain, with a feeling of fullness in the lower abdomen. These symptoms persisted so that in January, 1946, she underwent operative treatment at Camp Borden Hospital. Appendectomy and right oöphorectomy were performed, and diagnosis of regional ileitis was made on the operating room table. She improved following this operation.

In June, 1947, a three-day period of symptoms passed off without treatment. She was admitted to Christie St. Hospital in March, 1948, having suffered for one month from persistent lower abdominal crampy pain, nausea and watery diarrhœa of four to eight bowel movements daily. Abdominal examination showed a tender mass the size of a large orange in the right lower quadrant. This was freely movable and could be easily pushed into the pelvis out of reach of the palpating hand.

Her temperature was normal and the laboratory examination was as follows: Hb. 70%; red blood cells 3,700,000; white blood cells 4,500; sedimentation rate 56 mm. per hour. Stool examination was negative for blood.

A small bowel enema showed deformity and narrowing of the terminal ileum and outlined a loop of sigmoid colon through a fistulous connection (see Fig. 8). The barium enema revealed filling defect in the cæcum, terminal ileum and an adherent loop of sigmoid colon with ileo-colic fistula (see Fig. 9). A right hemicolectomy including the approximately eighteen inches of diseased terminal ileum, was performed, and the sigmoid loop at the site of the fistula was converted into a Mikulicz-type of colostomy through a left gridiron incision. Fig. 10 shows the specimen removed with probe passing through the fistula. The colostomy was subsequently closed when the pathologist confirmed that biopsy of the colonic aperture of the fistula was free of Crohn's disease. Needless to say the small bowel specimen was typical of fibro-stenotic regional enteritis.

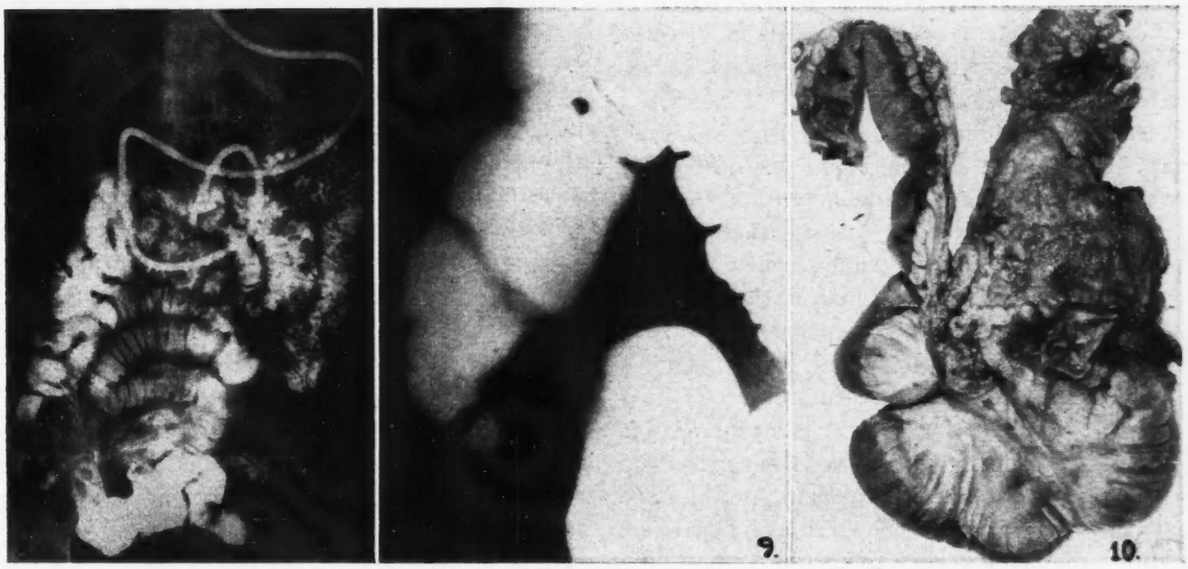


Fig. 8. (Case 4).—Small bowel enema showing disease in terminal ileum. **Fig. 9.** (Case 4).—Barium enema demonstrating defect in cæcum. **Fig. 10.** (Case 4).—Specimen removed.

At present her weight is 115 lb. and sedimentation rate is normal. Her bowel habit is 1 or 2 formed stools daily, with occasionally several solid formed movements per day. She has not returned to work, for recently she became married. Postoperative studies show no small bowel or large bowel disease at time of writing.

These four cases of far-advanced regional enteritis demonstrate the gratifying results of resection surgery. All are free of symptoms one to four years after operation. Three cases demonstrate late obstructive symptoms and two of these had ileo-colic fistulæ. It is felt that less radical surgery would not have sufficed, for indeed, one patient (Case 3) had undergone

"short-circuiting" surgery elsewhere with subsequent recurrence of symptoms with serious complications. Only the passage of time will prove if the present cures are permanent.

REFERENCES
1. CROHN *et al.*: *J. Am. M. Ass.*, **99**: 1932.
2. COOK, E. A.: *Proc. Roy. Soc. Med.*, **39**: 1946.
3. BAKER, SIR P. M.: *Proc. Roy. Soc. Med.*, **39**: 1946.
4. BENNETT, A. H.: *The Lancet*, **1**: 1946.
5. LYALL, A.: *Glasgow M. J.*, January, 1945.
6. WARREN, S.: *Am. J. Pathol.*, May, 1948.
7. HADFIELD, G.: *The Lancet*, **2**: 775, 1939.

SELF-SUSTAINED HYPERTENSION IN THE ALBINO RAT: A HYPOTHESIS TO EXPLAIN IT*

Sydney M. Friedman, M.D., Ph.D. and Constance L. Friedman, Ph.D.

Department of Anatomy, McGill University, Montreal, Que.

THE idea that the adrenal cortex is in some way involved in the pathogenesis of essential hypertension is not new. It has been entertained ever since Goldblatt first observed that some adrenal cortical tissue was necessary for the induction and maintenance of an elevated blood pressure following constriction of the renal artery.[1, 2] Subsequently, other workers demonstrated first, that adrenal cortical extract, and later that desoxycorticosterone, a synthetic adrenal cortical steroid, could replace the adrenal cortex in this function.[3, 4, 5] On the basis of this work it was postulated that the rôle of the adrenal was to sensitize the blood vessels or maintain them in such a state that they could react to circulating pressor material liberated from the kidney.

Doubt was cast on this purely secondary rôle for the adrenal cortex when several groups of workers observed that desoxycorticosterone acetate (D.C.A.) could elevate blood pressure not only in Addisonian patients[6, 7] but in normal man as well.[8] In addition, Selye and his co-workers, using large doses of D.C.A. together with saline as a substitute for drinking water, induced hypertension in a variety of animal species.[9, 10] This worker suggested that essential hypertension could result from an excess liberation of D.C.A.-like material by the adrenal cortex as a result of stress.[11] Thus, the adrenal was moved from a secondary position to one of possible primacy in the etiology of hypertensive disease in man, although there is only suggestive evidence of actual hypersecretion of the adrenal cortex in some cases of essential hypertension.[12]

Using sensitive functional tests we have been able to determine that small doses of D.C.A. suffice to elicit a hypertension in intact rats not otherwise sensitized.[13] This finding indicates that proof of adrenal cortical involvement in man need not necessarily rest upon the demonstration of grossly excessive amounts of circulating corticoids. Further, we observed that, as in man, the elevation in blood pressure antedated alterations in renal function, and that when eventually renal function became impaired, the evolution of changes followed a pattern similar to that observed in man. Salt, and specifically the sodium ion, intensified the process.[14]

Despite the lack of early renal functional change it was consistently noted that renal hypertrophy occurred immediately following D.C.A. treatment. Investigation of this point showed a positive correlation between renal mass and blood pressure, indicating that the kidneys were actually involved from the start of the process.[15] Renal function was thus maintained at apparently normal levels by a compensatory increase in renal mass. Eventually this compensation fails and the deterioration of renal function becomes evident.

Since D.C.A. impaired kidney function it might have been supposed that hypertension resulted from the liberation of a renal pressor agent by a damaged kidney. In several experiments in which both kidneys were removed from animals under D.C.A. treatment, however, blood pressure rose to new heights.[15] This suggested that the pressor action of D.C.A. was extra-renal and that involvement of the kidney was due to its opposition to this action.

In all of this work the effects of D.C.A. were observed to reverse rapidly if treatment was stopped. It seemed of interest to determine whether more intensive treatment might lead to an irreversible hypertension. The experiment here reported was designed to test this possibility. A self-sustained, permanent hypertension did result. This is of particular interest since it represents an endogenously maintained hypertensive state induced originally by a steroid closely resembling a natural secretion.

Experimental.—Thirty-six male albino rats of the Sherman strain, weighing approximately

* This work was supported by a grant from The American Foundation for High Blood Pressure.

70 grams, were divided into three groups. Group 1 consisted of 11 animals serving as untreated controls, while the 11 animals of group 2 were subjected to a unilateral nephrectomy to serve as uninephrectomized controls. The 14 animals of group 3 were subjected to a unilateral nephrectomy following which they received D.C.A. pellets by subcutaneous implantation, one-third of a 75 mgm. Cortate pellet being implanted on the 4th, 8th, 12th, 16th, 21st and 25th days of the experiment.

The experiment was divided into 2 phases. In the first period D.C.A. was administered as described to the animals of group 3 together with 1% saline as drinking water. Saline was similarly substituted for the drinking water of the uninephrectomized control group 2 during this period. After 28 days of this active and intensive treatment, when the average blood pressure of the D.C.A. treated group was well elevated (Table I), treatment was discontinued. In order to stop treatment abruptly all implanted pellets were removed from the animals of group 3 while both groups 2 and 3 were returned to tap water. Five animals from each of the two control groups and 7 from the treated group were sacrificed at the end of this first period.

The second period was given over to observing whether the hypertension induced by the intensive treatment with D.C.A. would regress or persist. The surviving 6 animals in each of the two control groups, and the 7 animals from group 3, were studied during this period, which lasted eleven and one-half weeks. All animals received food and tap water *ad libitum* and were in no way disturbed except for the measurement of blood pressure which was carried out repeatedly during this period. After 80 days of observation, when it became clear that hypertension was persisting in 4 of the 7 animals of group 3, the experiment was terminated.

Observations. — First period. — The findings are presented in Table I. After 28 days of intensive D.C.A. treatment, the average indirect blood pressure reading in group 3 was 150 mm. Hg. as compared with 117 and 113 in the two control groups. This finding was substantiated by the significant increase in heart weight ob-

TABLE I.

FIRST PERIOD—28 DAYS

Group No.	*1*	*2*	*3*
Treatment	*Intact control*	*Uninephrectomized control—saline fed*	*Uninephrectomized D.C.A.—saline*
No. of animals	11	11	14
Blood pressure mm. Hg.—28th day	117 ± 8	113 ± 11	150 ± 21
Heart wt. mgm./100 cm.^{2}	188 ± 9 (5 rats)	188 ± 14 (5 rats)	216 ± 17 (7 rats)
Kidney wt. mgm./100 cm.^{2}	377 ± 46 (5 rats)	362 ± 45 (5 rats)	470 ± 15 (7 rats)

SECOND PERIOD—80 DAYS

Group No.	*1*	*2*	*3*	
Treatment	*Intact control*	*Uninephrectomized control. Continued from first period.*	*Uninephrectomized D.C.A. stopped. Continued from first period.*	
No. of animals	6	6	7	
Blood pressure—average of 15 determinations	106 ± 8	106 ± 6	141	
			116 ± 15 (3 rats)	159 ± 18 (4 rats)
Heart wt. mgm./100 cm.^{2}	170 ± 13	183 ± 20	208	
			194 ± 7 (3 rats)	217 ± 16 (4 rats)
Kidney wt. mgm./100 cm.^{2}	416 ± 54	302 ± 17	362	
			341 ± 36 (3 rats)	376 ± 43 (4 rats)
Total wall/diameter as % vessels of 0-50 μ		64 ± 6	83 ± 5	84 ± 9
51-100 μ		62 ± 6	70 ± 9	81 ± 10
101-150 μ		56 ± 6	65 ± 12	69 ± 9

served in the animals sacrificed at this time. Evidence of interference with renal function was given by the significantly increased kidney weight.

Second period. — The findings are presented in Table I. After cessation of D.C.A. treatment the blood pressure of each animal was determined on 15 separate occasions. While the average pressure for group 3 remained consistently above the simultaneously determined control this was due to only 4 of the 7 animals whose pressure remained elevated throughout the remainder of the experiment. The pressure of the other 3 animals fell to normal levels within one week of cessation of treatment and remained within normal limits for the duration of the observed period. These findings are presented graphically in Fig. 1.

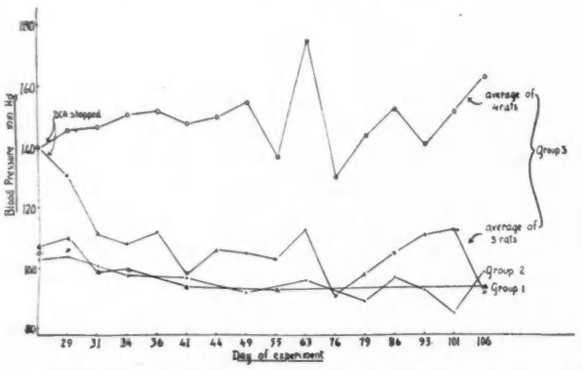


Fig. 1.—Average blood pressure values observed during the 80 day period following discontinuation of intensive D.C.A. treatment. Four of the seven treated animals remained "permanently" hypertensive.

The elevated blood pressure was reflected in an increased heart weight in only those animals of group 3 whose hypertension persisted. Renal involvement was indicated by an increase in the average kidney weight in group 3 compared with that of the uninephrectomized control group 2. This average increase in kidney weight was occasioned by increases in both the hypertensive and normotensive members of the group, but was somewhat greater in the 4 "permanently" hypertensive animals.

In agreement with the findings for kidney weight, pathological changes were observed in the kidneys of all animals in group 3, the difference between the hypertensive and normotensive members of the group being one of degree only. The most prominent change was a thickening of the arteriolar wall, apparently referable to medial hypertrophy. Both afferent and efferent arterioles were consistently involved, while vessels of larger calibre were less constantly affected. Eccentric thickenings of the wall were observed in many small arteries and what appeared to be necrosis of the media was observed in the pancreatic arteries of 2 of the "permanently" hypertensive animals.

In an effort to assess the observed vascular change more objectively, renal arterial channels were measured in both the control and treated groups. Approximately 50 control vessels were measured and 50 each in the hypertensive and normotensive animals of group 3. As shown in Table I, the hypertrophy in the 3 non-hypertensive animals differed only slightly from that observed in the 4 rats with sustained hypertension.

The kidneys were singularly free of other changes except for various stages of sclerosis in some few of the glomeruli in group 3. It should be emphasized that in each section most glomeruli were entirely normal in appearance.

Pathological examination of the heart revealed little change except for the appearance of numerous small scars in the myocardium of that animal whose pressure had remained higher than any of the others throughout the experiment.

DISCUSSION

Some explanation must be sought for the fact that, after discontinuation of intensive D.C.A. treatment, a permanent, self-sustaining hypertension developed in some animals. Since D.C.A. can and does damage the kidney, it seems reasonable to consider first the possibility that this is a form of renal hypertension, the Goldblatt "clamps" here being applied chemically rather than mechanically. This explanation seems somewhat unlikely since vascular lesions only slightly different in degree were observed in both the hypertensive and non-hypertensive animals. Because this degree of difference may be crucial, however, the possibility cannot be completely ruled out.

While the arteriolar "clamp" idea seems rather remote, the fact that D.C.A. is known to damage the kidney suggests strongly that the hypertension may be related in some way to this organ. Previous experiments in which the blood pressure of D.C.A.-treated animals rose to new heights after nephrectomy suggested that the kidney normally antagonizes the pressor action of D.C.A.[15] This leads us to speculate whether the sustained hypertension here

reported resulted from an inability of the kidney to handle even endogenously produced D.C.A.-like adrenal cortical material as a result of the original overdosage and damage with D.C.A.

On the basis of this and previous work, we have formulated an hypothesis which reconciles, at least in part, essential hypertension, hormonal (adrenal) hypertension, chronic renal (Goldblatt) hypertension, and the present "self-sustaining" hypertension. It should be clearly understood that the hypothesis to be suggested makes no claim to explain all of hypertension. The manifold factors involved in the maintenance of blood pressure make it unlikely that one explanation suffices for all cases of clinical hypertension. Our suggestion does, however, offer a synthesizing explanation for certain observations.

whenever the balance between the production of an adrenal D.C.A.-like pressor material and its handling by the kidney is interfered with so that an accumulation of the pressor material results. Thus, chronic hypertension induced by constriction of the renal artery, in which the damaged kidney cannot properly cope with even normal amounts of the adrenal material, would share a common pathway with, for example, the hypertension of Cushing's syndrome, in which the normal kidney cannot cope with the excess amounts of pressor substance. This would explain the fall in pressure which occurs when the adrenal cortex is removed in an animal with constriction of the renal artery. It should be borne in mind that not all adrenal cortical tumours would be expected to produce the pressor material, so that those reported cases[17] in which removal of the tumour failed

Fig. 2

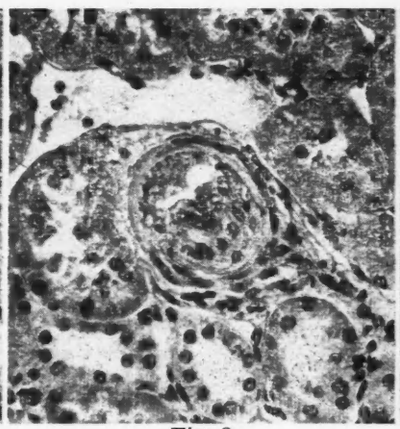


Fig. 3

Fig. 4

Fig. 2.—Small artery from kidney of rat which did not maintain hypertension when treatment was stopped. Note the eccentric thickening of the wall. **Fig. 3.**—Small artery from kidney of rat with "self-sustained" hypertension. Note the eccentric thickening of the wall. Same magnification as Fig. 2. **Fig. 4.**—Myocardium of rat with "self-sustained" hypertension. Note the numerous small scars.

(Considerable investigation has been carried out concerning the "renal pressor mechanism". The present hypothesis does not discount the importance of this work nor does it deny the possibility that such a mechanism is operative in certain cases, particularly in the acute early stage and in those cases where compression of the kidney or its blood supply is demonstrable and removal is followed by a return to normal pressure. Since increases in neither renin nor hypertensin have been demonstrated in essential hypertension, however, it seems to be a generally held opinion[16] that the renal pressor mechanism is not responsible for chronic hypertension.)

As extended, our hypothesis states simply that hypertension may be expected to arise

to alleviate the hypertension would not invalidate the hypothesis.

The observation of Pickering[18] that removal of a constricted kidney late in the course of renal hypertension is not followed by a reduction in pressure would thus be explained on the basis of the pressor material being adrenal in origin rather than renal. On the other hand, Byrom and Dodson's observation,[19] which formerly seemed to conflict with that of Pickering, is similarly understandable. These workers found that if, in the late phase of renal hypertension, the constriction was removed, blood pressure fell. By the present hypothesis, removal of the constriction at any stage might be expected to improve the renal handling of the adrenal pressor agent, either partially or com-

pletely, depending on the amount of residual damage. Similarly, pathological involvements of the kidney will be accompanied by hypertension only in those cases where the specific mechanism for handling the pressor material is affected.

Examination of the evidence with regard to renal hypertension has led Grollman to discount the primacy of a renal pressor mechanism and recently, with Muirhead and Vanatta[20] to state that "the kidney normally, in addition to its excretory function, also exerts a function which is concerned in the maintenance of normal blood pressure levels. Hypertension of renal origin according to this view is not due to the liberation of a pressor agent, but results from a failure of this activity of the kidney". The present hypothesis satisfies the arguments of this investigator but substitutes for the broadly phrased renal deficiency an already circulating adrenal pressor material.

A similar examination of the evidence has led Braun-Menendez *et al.*[21] to state recently

> "Renal mass (or renal function) is normally conditioned by the concentration in the blood of a substance X. An increase in X determines an increase in renal mass (or function) while the opposite follows when X diminishes. On the other hand if X increases and there exists any impediment to the kidney increasing its function in order to maintain the hypothetical principle at a normal level, arterial hypertension results."

This statement was based on an exhaustive investigation of factors determining renal hypertrophy as well as on careful work with parabiotic animals which clearly indicated that normal renal tissue opposes renal hypertension. They also observed that nephrectomized animals become hypertensive. In our previous experiments, we have found that a linear relationship exists between blood pressure and renal mass in D.C.A.-treated animals and that the accumulation of D.C.A. by overdosage results in hypertension. Accordingly, the present hypothesis would substitute "adrenal cortical pressor material" for "substance X" in the statement by Braun-Menendez *et al.*

Examination of the problem of essential hypertension from the renal functional standpoint led Smith, Goldring and Chasis[22] to conclude that it was illogical to suppose that the kidney was the source of pressor material which caused arterial constriction in the kidney and at the same time that the constriction caused the appearance of the pressor agent. The present hypothesis removes this difficulty by offering a pressor material produced extra-renally. Selye's[10] view that overproduction of the adrenal cortex occurs in stress and may lead to hypertension fits the hypothesis in that it is one of the two ways in which hypertension can be caused.

In the present state of knowledge, when it is not even certain that essential hypertension in one disease, it is footling to attempt to postulate an all-embracing theory. Our suggestion does, however, attempt to reconcile certain observations. It is submitted at the present time as a partial correlation of some of the voluminous data which have accumulated as a direct outcome of Goldblatt's initial demonstration of the central position of the kidney in the genesis of hypertension.

SUMMARY

1. After discontinuation of intensive treatment with D.C.A. and saline 4 out of 7 animals maintained a "self-sustaining" hypertension. This hypertension persisted until the experiment was terminated 80 days later.

2. A hypothesis to reconcile various observations in experimental and clinical hypertension is presented. This hypothesis suggests that the maintenance of normal pressure depends, in many cases, on a correct balance between the production of a pressor material from the adrenal cortex and its handling by the kidney.

The authors would like to express their gratitude to Dr. W. Alan Wright and Mr. W. E. Fielding of the Schering Corporation who generously supplied the Cortate pellets used in this work.

REFERENCES

1. GOLDBLATT, H., LYNCH, J., HANZAL, R. F. AND SUMMERVILLE, W. W.: *J. Exper. Med.*, **59**: 347, 1934.
2. GOLDBLATT, H.: *Ann. Int. Med.*, **11**: 69, 1937.
3. DELL'ORO, R.: *Rev. Soc. Argent. de Biol.*, **18**: 13, 1942.
4. GAUDINO, N. M.: *Rev. Soc. Argent. de Biol.*, **20**: 470, 1944.
5. PAGE, I. H.: *Am. J. Physiol.*, **122**: 352, 1938.
6. FERREBEE, J. W., RAGAN, C., ATCHLEY, D. W. AND LOEB, R. F.: *J. Am. M. Ass.*, **113**: 1725, 1939.
7. RYAN, E. J. AND MCCULLAGH, E. P.: *Cleveland Clin. Quart.*, **7**: 19, 1940.
8. PERERA, G., KNOWLTON, A. I., LOWELL, A. AND LOEB, R. F.: *J. Am. M. Ass.*, **125**: 1030, 1944.
9. SELYE, H. AND HALL, C. E.: *Arch. Path.*, **36**: 19, 1943.
10. SELYE, H., HALL, C. E. AND ROWLEY, E. M.: *Canad. M. A. J.*, **49**: 88, 1943.
11. SELYE, H. AND PENTZ, E. I.: *Canad. M. A. J.*, **49**: 264, 1943.
12. FISHER, J. A. AND HEWER, T. F.: *J. Path. & Bact.*, **59**: 605, 1947.
13. FRIEDMAN, S. M., POLLEY, J. R. AND FRIEDMAN, C. L.: *J. Exper. Med.*, **87**: 329, 1948.
14. FRIEDMAN, S. M., FRIEDMAN, C. L. AND POLLEY, J. R.: *Am. J. Physiol.*, **153**: 226, 1948.
15. FRIEDMAN, S. M. AND FRIEDMAN, C. L.: *J. Exper. Med.*, **89**: 631, 1949.
16. OGDEN, E.: *Bull. New York Acad. Med.*, **23**: 643, 1947.
17. SMITHWICK, R. H.: *Am. J. Med.*, **4**: 744, 1948.
18. PICKERING, G. W.: *Clin. Sc.*, **5**: 229, 1945.
19. BYROM, F. B. AND DODSON, L. F.: *Proc. Roy. Australasian Coll. Physicians*, **3**: 3, 1948.
20. GROLLMAN, A., MUIRHEAD, E. E. AND VANATTA, J.: *Am. J. Physiol.*, **157**: 21, 1949.
21. BRAUN-MENENDEZ, E. AND VON EULER, U. S.: *Rev. Soc. Argent. de Biol.*, **24**: 355, 1948.
22. SMITH, H. W., GOLDRING, W. AND CHASIS, H.: *Bull. New York Acad. Med.*, **19**: 449, 1943.

THORACOPLASTY FOR PULMONARY TUBERCULOSIS

G. M. Brownrigg, M.D.

The St. John's General Hospital and The Sanatorium, St. John's, Newfoundland

THIS is a report on 100 consecutive cases of pulmonary tuberculosis treated by thoracoplasty. The majority of these were modern three-stage thoracoplasties. A few had limited apical thoracoplasties and additional stages were necessary in other cases. In all, 308 operative stages were employed. This does not include supplementary procedures such as Monaldi drainage or cavity packing. The last operation in this series was performed more than 16 months ago.

Selection of cases.—All cases in this series had cavernous or fibro-cavernous pulmonary tuberculosis with persistently positive sputum prior to thoracoplasty. Cases with concomitant tuberculous empyema are included but those cases for which thoracoplasty was undertaken primarily for tuberculous empyema with negative sputum are excluded from the series. In every case in this series cavernous disease was present prior to operation. All but three cases had cavities 2 cm. or larger in diameter. Many were classified as giant cavities. No case was submitted to thoracoplasty until preliminary rest treatment and pneumothorax, supplemented by pneumonolysis where indicated, had failed. Many cases had phrenic interruptions with or without pneumoperitoneum to prepare them for thoracoplasty. Thus there were no cases of minimal disease without cavity formation on whom a so-called primary relaxing thoracoplasty was performed. Because of the irreversibility of the procedure we have never accepted it as suitable for such cases. We have no difficulty in having patients submit to thoracoplasty. We do have considerable numbers of patients who are anxious to submit to operation but who must be refused because of the nature of their disease.

The existence of exudative lesions on the side on which thoracoplasty was being performed was not considered a contraindication to thoracoplasty but in general patients with actively spreading acute lesions were not accepted. The same criterion was applied to contralateral lesions. Some cases had contralateral cavitation the control of which was attempted by various means prior to or subsequent to thoracoplasty.

Preoperative studies.—Vital capacity studies were done on all patients. Generally a vital capacity of at least 1,200 c.c. was considered desirable. In a few, findings lower than this were accepted. In some cases bronchoscopy was employed preoperatively but it is not done routinely. Many were bronchoscoped postoperatively to remove secretions if these seemed excessive. Monaldi drainage was employed in some cases where needling of cavity showed that we were dealing with a tension cavity. We are as yet uncertain of the value of this procedure. We are certain that neither size, nor position, nor the shape of a cavity can be accepted as a criterion in judging whether it is a blocked or freely communicating cavity. There have been some complications from cavity drainage as a preliminary to thoracoplasty and there have been persisting sinuses following thoracoplasty. The majority have healed. We do not feel that our data are, in this respect, worthy of study.

In all cases preoperative blood studies were done. In some preoperative transfusions were necessary. All received blood either during or after each stage. In the last 50 cases all were given blood during each operation.

Anæsthesia.—Avertin was employed as basal anæsthesia in all of these cases. Gas oxygen and cyclopropane were used routinely. In some cases where anterolateral stages were necessary local anæsthesia was employed but these were few.

Technique.—In all but a few of the earliest operations a modern 6 or 7 rib thoracoplasty has been employed. Routinely this is performed by a posterior approach in three stages. At the first stage the entire first and second ribs with their cartilages are removed. At the second stage the third and fourth ribs are removed with their transverse processes. The cartilage of the third rib is commonly but not routinely removed. The fourth and subsequent ribs are removed to the projection point as determined by x-ray findings. The third stage consists of the removal of the fifth, sixth and sometimes of the seventh rib with their transverse processes. The angle of the scapula has been removed in a number of cases as suggested by Holman. In 44 consecutive cases of the present series apicolysis to the second or third rib posteriorly has been employed routinely at the first stage in an attempt to evaluate the

usefulness of this procedure and additional cases, not included in this series, have likewise been done in similar fashion.

Mortality.—There were no deaths during operation from any cause. Nine deaths occurred postoperatively. Of these four died after the first stage, two after the second stage and three after the third stage. Two of these deaths were from massive hæmoptysis. One was from pulmonary embolus and one from concealed hæmorrhage into the wound which was not identified until postmortem. One was due to massive postoperative spread of tuberculosis. In the remaining four cases the cause was ill defined and these cases, all with advanced disease, should perhaps not have been accepted for thoracoplasty. But many similarly advanced cases with apparently similar disease survived operation and many are classed as successful results. It is my conviction that low mortality figures can be easily obtained if doubtful cases be rejected for operation; but this involves denying the operation to some who will survive and are capable of having their disease controlled.

Complications.—Shock was a troublesome and worrying complication in many cases but was always controllable by adequate blood replacement therapy. It is now our routine to administer blood routinely during every stage of thoracoplasty. Since adopting this routine we have found that it is a comparatively minor complication even where apicolysis is added to the first stage. Indeed most patients showing evidence of shock do so during the second stage. *Wound infection* has been a source of considerable trouble. In three cases it was sufficiently serious to cause prolonged delay between stages but two of these patients had results which are classed as successful. In one case the wound infection was undoubtedly due to the opening of a sinus created by cavity drainage prior to thoracoplasty. In the others the cause was ill defined. Other less serious wound infections occurred but were not sufficiently serious to cause prolonged delay in proceeding with subsequent stages. Two other cases of serious wound infection, one fatal, due to traversing the sinus of a Monaldi drainage performed prior to thoracoplasty occurred subsequent to the present series and are not included.

Postoperative spread.—This difficult-to-define term is employed to indicate cases where as a result of operation spread of tuberculous disease occurred in the operative or contralateral lung, of a nature sufficiently serious to cause postponement of operation, and to prejudice the final result of operation. There was one death which was attributed to this cause. There were two additional cases in this group in both of whom, although clinically well, the result is classified as unsatisfactory. In both sputum has remained positive over a period of years.

RESULTS

Only those patients are classified as satisfactory who are clinically well and have persistently negative sputums following thoracoplasty. All sputum must be persistently negative to smear and culture and there must be negative gastric lavage. Despite the clinical status of the patients, those who remain in hospital, or are discharged clinically well with sputum positive are classed as unsatisfactory. By these standards 66 patients (66%) are classified as satisfactory. Three cases are classified as doubtful: two because follow-up was inadequate and one because in spite of persistently negative sputums tomographic studies showed what appeared to be a persistent cavity; 31% are classified as unsatisfactory.

SUMMARY

1. One hundred consecutive cases of pulmonary tuberculosis in whom 308 stages of thoracoplasty were performed for cavernous disease with positive sputum are presented.

2. The operative case mortality rate was 9%.

3. Sixty-six per cent are classed as satisfactory results and 31% as unsatisfactory.

BIBLIOGRAPHY

1. O'BRIEN, E. J.: *J. Thoracic Surg.*, **3**: 159, 1933.
2. O'BRIEN, E. J. *et al.*: *J. Thoracic Surg.*, **9**: 364, 1940.
3. HOLMAN, E.: *J. Thoracic Surg.*, **6**: 496, 1937.
4. MILLER, A. F. *et al.*: *J. Thoracic Surg.*, **9**: 634, 1940.
5. MONALDI, V.: *Tubercle.*, **28**: 223, 1947.
6. SEMB, C.: *Acta Chir. Scandinav.*, **74**: 478, 1934.
7. ALEXANDER, J.: The Collapse Therapy of Pulmonary Tuberculosis, Chas. C. Thomas, Baltimore, 1937.

47 Queen's Rd.

The foundation for good mental health, as well as for physical development, is laid in pre-school years. Behaviour patterns are formed then. Some early trends in thought and action are desirable and should be encouraged and strengthened. Some must be directed, and others changed entirely, so that a child will grow up to live happily and comfortably with his fellows. Wise parents are advised to study carefully how to direct and mould tendencies which are bound to have lasting effect on the lives of their children.

REHABILITATION: THE THIRD PHASE OF MEDICINE*

Howard A. Rusk, M.D.†

New York, N.Y.

ONE of the most significant advances made in rehabilitation during the war and the immediate postwar period has been the increased recognition given to medical rehabilitation as an integral part of medical care. Just as satisfactory job placement is the capstone of any successful program of services to the handicapped, medical rehabilitation, starting at the earliest possible moment following acute illness or injury, is the foundation, since all subsequent rehabilitation processes are built upon the residual disability which medical care cannot eliminate.

Unfortunately, until the advent of World War II, medical care, psychologic problems and vocational rehabilitation were too frequently considered as separate and distinct processes having little relationship to each other. That they are interdependent and inseparable has been demonstrated by the successful programs in military and veterans' hospitals and has been recognized in civilian rehabilitation by the Barden-LaFollette Amendment which expanded the federal-state vocational rehabilitation programs, to include physical restoration, psychiatric services, and medical care, as well as vocational guidance and training.

Immediately following World War I, as today, there was a developing interest in increasing rehabilitation opportunities for the disabled. Unfortunately, this interest died in most quarters in the years between the wars. From it, however, did come some pioneer institutions, such as the Institute for the Crippled and Disabled in New York and the Curative Workshop of Milwaukee and the Cleveland Rehabilitation Clinic, and some basic legislation, such as the Federal Vocational Rehabilitation Act of 1920. The failure of the movement to gain sufficient stature to become an accepted part of medicine, can be attributed to the fact that it was restricted largely to guidance, trade training, and the purely vocational aspects of rehabilitation. Few provisions were made for physical restoration or reducing the physical disabilities of the trainees. When the physical condition became static, a program of vocational rehabilitation was planned, "training around" the disability rather than attempting to reduce or eliminate it through medical procedures. In many instances, a comparatively large expenditure of time and money was necessary for vocational rehabilitation when, by the expenditure of a few weeks and a more modest sum, the physical limitations could have been substantially reduced with an automatic increase in employment potentials. Such restrictions made it impossible for the state vocational rehabilitation program operating under the Federal Office of Vocational Rehabilitation to give adequate service to their clients. Such failure is shown by the fact that, until the basic philosophy of this program was changed by the Barden-LaFollette Act of 1943, in 23 years only 210,000 persons were rehabilitated, although over a million persons were in need of such aid at any given time during that period.

EXTENT OF THE PROBLEM

Although the focus of attention has been centered on the disabled veteran, the extent of disability among our civilian population is far greater. There were 19,000 amputations during World War II, but over 120,000 major amputations during this same period among our civilian population. Approximately 1,500 men were blinded while in military service during the last war, but 60,000 civilians lost their sight during this period. Some 265,000 men were permanently disabled as a result of combat injuries during the war, but 1,250,000 civilians were permanently disabled by disease and accidents in the corresponding four years.

The lack of a systematic approach requiring the reporting of cases of physical disability to a central agency, together with varying subjective interpretations of "what constitutes a handicap", makes it difficult to stake out the boundaries of the field of rehabilitation and services to the handicapped in any quantitative fashion.

Although a census of such conditions has been proposed on several occasions (legislation calling for an exhaustive census of the physically handicapped was introduced in Congress by Senator Johnson of Colorado on March 15, 1948), there has never been a complete survey of the extent of disability in the United States.

---

* Read before the Annual Meeting of the Ontario Medical Association, London, Ont., June, 1949.

† Professor and Chairman of the Department of Rehabilitation and Physical Medicine, New York University College of Medicine, New York.

The most comprehensive source of information at present is the National Health Survey, conducted by the U.S. Public Health Service in 1935-36. In this survey, 800,000 families in 83 cities and 23 rural areas of 19 states were studied. The reliability of this study has been demonstrated in other extensive surveys on the extent of chronic disease and crippling conditions, and although results are not strictly comparable, due to different methods of enumeration, they bear out the fact that the National Health Survey is probably the best source available for such statistics, although later studies indicate that its results are conservative.

According to the National Health Survey, there were, in 1935-36, some 23,000,000 persons in the United States handicapped to some extent by disease, accidents, maladjustment or war. One-third of all draftees were rejected as unfit, and more than 1,000,000 had to be discharged shortly after induction. It is estimated that there are over 7,000,000 persons in the United States disabled by diseases of the heart and arteries, 6,850,000 from rheumatism and arthritis, and 2,600,000 from orthopædic conditions. A statistical review of the casualties in industry for 1947 shows there were 2,050,000 persons temporarily disabled and 91,000 persons permanently disabled from accidents or occupational disease. One in every 30 workers suffered a disabling injury.

These are the numbers, but they cannot tell the story of pain, anxiety and suffering, and all of the vital secondary problems that disease and disability leave in their wake. Aside from pain and tearing personal and family anguish, the economic costs of disease and disability are staggering.

Rehabilitation in the Veterans' Administration

There was, at the war's end, some skepticism of the value of medical rehabilitation in the Veterans' Administration hospitals for veterans of World War I and those of the Regular Army who suffered from chronic illness and long-standing disabilities. Some physicians feared that young veterans of World War II would soon lose ambition, initiative and a desire for personal independence through association with older veterans who had developed "hospitalitis" as a result of boredom, frustration and hopelessness. In the veterans' hospitals where comprehensive, dynamic rehabilitation programs are now in operation, the results have been not only revealing but encouraging.

Typical of the results obtained in the Physical Medicine Rehabilitation program of the Veterans' Administration is a study of 130 chronic neurologic patients in one hospital, all but two of whom were World War I veterans, and many of whom had not been out of bed in ten years. After nine months of physical medicine rehabilitation, 25 had left the hospital and were employed; 40 others had been discharged to their homes capable of light work, and, of those remaining, 30 were ambulatory and undergoing advanced rehabilitation and 25 were capable of some self-care. All but 10 of the group had shown worthwhile, permanent improvement. With a five-year expectancy of these patients, and a per patient day hospitalization cost of over $12, rehabilitation of this one group has saved the government, and eventually the taxpayer, over $1,125,000. It would seem logical that a similar program for the civilian chronically ill would result in comparative savings.

In another study at the Veterans' Administration Hospital at Manhattan Beach in Brooklyn, through rehabilitation, 74 of a group of 126 patients suffering from such diseases as arthritis, multiple sclerosis, paralysis and Buerger's, Parkinson's and heart disease, have been discharged from the hospital and are now at home taking care of themselves. All but 13 of the original 126 patients have recovered all or part of their ability for self-care. At the beginning of this program, 83 of these veterans were "completely hopeless", but 49 in that group have been rehabilitated to the point of complete independence, and the remainder are capable of self-care.

The Economic Aspects

The experience of the Federal Office of Vocational Rehabilitation has also shown how rehabilitation pays off economically. During 1944, 43,997 persons underwent rehabilitation under the joint federal-state vocational rehabilitation programs. Of this group, 22 had never held jobs, and 90% were not employed at the time they started their rehabilitation. Their average annual wage after rehabilitation was $1,768, as compared with $148 before. The

cost of their rehabilitation was but $293 per case, a single rather than annually recurring expenditure.

These spectacular results are not attributable to the short labour market of the war. The approximately 44,000 persons rehabilitated in 1947 are now earning at a rate exceeding $70,000,000 a year, and this year they will pay over $5,000,000 back to the Federal Government in Federal income taxes alone. The average rehabilitant was 31 years of age. If he works during 85% of his life expectancy, he will pay $10 in Federal income taxes for each dollar the Federal Government has invested in his rehabilitation.

Prior to rehabilitation, many of these persons now wholly or partially independent, were on local relief rolls at an annual cost of from $300 to $600 per case. In a study of such cases made in 1947 in Michigan, the relief costs of 400 cases were approximately $250,000 per year. This same group, after rehabilitation, had been removed from the relief rolls, for they were earning more than $600,000 a year. In another state, the program gave rehabilitation services to a young man of 21 who was drawing $30 a month, or $360 a year in aid to the blind. He was trained to operate a vending stand, and at the end of his first year on the job, paid $250 in income taxes.

REHABILITATION IN THE GENERAL HOSPITAL

Although it would seem logical that medical rehabilitation would be an important service in every civilian hospital, there has been little or no attempt, until recently, to establish such programs in civilian hospitals. Of the 1,468,714 hospital beds in the United States in 1946, 44% were in general hospitals, but these 641,331 beds cared for over 92% of all patients. Rehabilitation, in varying degrees, has been available in some tuberculosis, mental and other specialized hospitals, but little provision has been made for dynamic convalescent care and rehabilitation of the over 14,000,000 persons who are patients in general hospitals each year.

The first comprehensive, total medical rehabilitation program in any community hospital in this country has recently been inaugurated at Bellevue Hospital in New York. Operated under the professional direction of the Department of Rehabilitation and Physical Medicine of the New York University College of Medicine, the service has bed facilities for 80 patients and offers a program of physical medicine, physical therapy, occupational therapy, corrective physical rehabilitation, social service, corrective speech, psychologic services, vocational guidance, education and planned recreation. It operates as a service department to the other departments of the hospital in much the same manner as the x-ray and laboratory, and treats both inpatients and outpatients on reference from the other services of the hospital.

The rehabilitation service in Bellevue Hospital which will be enlarged to 600 beds when the construction planned is completed, is the first step in a plan by the Department of Hospitals of the City of New York to provide all patients in municipal hospitals of the city with medical rehabilitation services. The extent to which rehabilitation has entered into future planning in New York in both public and private hospitals is shown by a recent report of the Hospital Council of Greater New York, in which it was suggested that 25% of the bed capacity of the city's general hospitals should be allocated for convalescence and rehabilitation. This would mean one such bed for each 1,000 of the city's population.

The interest in extending medical rehabilitation services in general hospitals is not limited to New York City or other large urban areas. The Veterans' Administration has recently established such services as major departments with specified bed allocations in all Veterans' Administration hospitals. The New York State Preparedness Commission has recommended that the State should build or acquire and support a chronic disease hospital centre contiguous to a general hospital, in close proximity to a medical school, and staffed and operated by contract with such hospital and medical school in each five geographic regions of the state. They have also recommended that "rehabilitation services for the disabled and chronically ill be developed as rapidly as possible in selected general hospitals throughout the State by providing the services of trained personnel and by providing funds for the training of needed personnel in this field". Today, throughout the nation, there are some 150 communities which have expressed interest in establishing rehabilitation services either independently or in conjunction with existing hospitals, medical schools or community agencies.

TRAINING OF PERSONNEL

Facilities *per se*, however, will be of little help in meeting this tremendous problem without sufficient trained personnel to operate them. Today, a number of medical schools have recognized the increased need both for giving general practitioners some training in this field and for providing training opportunities for specialized personnel. One of the first medical schools to start such a program is New York University, where a Department of Rehabilitation and Physical Medicine has been in existence as a major department of the college for over a year and a half. Major activities are training, research, and patient care, through the use of the teaching facilities of the College of Medicine, the Rehabilitation and Physical Medicine Service of Bellevue Hospital, and the Institute of Rehabilitation and Physical Medicine of the New York University-Bellevue Medical Centre.

RETRAINING FOR DAILY LIVING

Although we have unexcelled institutions for definitive medical care and for vocational training, outside of the military services and the Veterans' Administration, there is but a small handful of civilian agencies and organizations equipped to provide for the patient with a physical disability the necessary retraining in physical skills which are a requisite for later vocational training. The physician in the past has thought too much about the physiological and clinical aspects of the patient's disability. The vocational counselor too frequently has thought only in terms of physical skills which could be utilized vocationally. Between the two, however, there is a wide area through which most physically handicapped persons must go when their definitive medical care is completed but before they are ready to undergo vocational training. In this area lies the physical retraining in skills necessary for the carrying on of the activities inherent in daily living and common to all types of work.

Except in a few isolated instances, the physically handicapped person must be retrained to walk and travel, to care for his daily needs, to use normal methods of transportation, to use ordinary toilet facilities, to apply and remove his own prosthetic devices, to communicate either orally or in writing. These are such simple things, but they are frequently overlooked, though the personal, vocational and social success of the handicapped person is dependent upon them.

The practice of rehabilitation for the compensation or for any doctor begins with the belief in the basic philosophy that the doctor's responsibility does not end when the acute illness is ended or surgery is completed; it ends only when the individual is retrained to live and work with what is left. This basic concept of the doctor's responsibility can be achieved only if rehabilitation is considered an integral part of medical service. Any program of rehabilitation is only as sound as the basic medical service of which it is a part. The diagnosis and prognosis must be accurate, for it is upon them that the feasibility of retraining is determined.

In addition to the general diagnostic studies, the medical evaluation of the orthopædically handicapped must include muscle tests, joint range of motion, and tests for the inherent needs in daily living. In the Rehabilitation Service at Bellevue Hospital, a check list of 96 items is used to determine these factors. They include: first, bed activities, such as moving from place to place in bed, and the ability to sit erect; second, toilet activities; third, eating and drinking; fourth, the ability to dress and undress, such as tying shoe laces, manipulating buttons, zippers and other fasteners, and applying and removing braces; fifth, hand activities, for example, winding a watch, striking a match and using various door knobs and latches; sixth, wheelchair activities, getting from the bed to the wheelchair, the wheelchair to bed, and in and out of the bathtub; and finally, elevation activities, which include the needed abilities for walking, climbing and traveling.

At first glance, such a test list sounds formidable and time-consuming, but in reality, the information may be easily obtained by a therapist, nurse, a well-trained volunteer or a member of the patient's family. From special check sheets used for charting the activity accomplishments, information is readily available both on the status of the patient at the time of admittance, and his progress while undergoing rehabilitation.

The use of such a check list is particularly helpful if personnel are not available to do definitive muscle testing and accurate range of motion determination, for the daily activities test can be completed in the hospital, the physician's office or the patient's home. The sub-

sequent training program is designed to teach the patient the various skills and activities which he cannot perform.

In Bellevue Hospital and the Institute of Rehabilitation, after the basic medical work-up, and the range of motion, muscle, and needs of daily living tests, the physician, in conference with other staff members, prescribes a five hour a day program for the patient. These prescribed activities include training in the ambulation and elevation rooms and the remedial gymnasium, occupational therapy, physical therapy, speech therapy, or any other activity which may be helpful in meeting the specific needs of the patient.

In a comprehensive rehabilitation program, vocational guidance specialists should also be available to do guidance and testing, in order that the patient may be started on a prevocational exploratory and work-testing program as soon as it is medically feasible. However, good basic rehabilitation can be carried out with the personnel available in the ordinary general hospital, if such a program is properly organized, supervised and prescribed by the physician.

Regardless of the type of disability, the responsibility of the compensation physician to his patient cannot end when the acute injury has been cared for. It ends only when the physician has taken the responsibility for seeing that proper referral has been made to those agencies and institutions which are equipped to rehabilitate and retrain the patient with a residual physical disability. The compensation physician who fails to see that those patients under his care receive the full benefits of modern methods of medical rehabilitation and retraining, is in the same category as the physician who still persists in using dietary restriction alone in the management of diabetes, when insulin is available, for medical care is not complete until the patient has been trained to live and work with what he has left.

At the same time that the cultivated areas of the earth are gradually being destroyed by erosion, its population is steadily increasing. It doubled in the course of the 19th century. Today the population of the globe increases by two every three seconds, *i.e.*, by more than 55,000 a day, about 20,000,000 in a year, and well over half a milliard in each generation.

FOLLOW-UP ON LUMBAR DISC LESIONS

O. S. Waugh, M.D., H. F. Cameron, M.D., H. G. Scarrow, M.D. and J. C. Howarth, M.B., Ch.B.

Department of Neurosurgery, Deer Lodge Hospital, Winnipeg, Man.

AN attempt has been made to evaluate the results obtained in patients suffering from low back pain and sciatica, treated in the Department of Neurosurgery, Deer Lodge Hospital. This survey reviews a series of 70 consecutive cases subjected to operation, and a series of 63 concurrent cases, continued on non-operative treatment—a total of 133 patients. The latter series is reviewed as a control on the results obtained in the former, rather than as a direct comparison of methods of treatment, as it may well be asked "What has happened to the patients on whom no operation was performed?"

All cases included in this follow-up received treatment in the Department of Neurosurgery between September 1, 1944 and April 30, 1946, a period of 20 months. In June, 1947,[1] a preliminary 18-month summary was reported, and this has now been extended to a three-year period, terminating in December, 1948.

The Special Treatment Service Centres of the Department of Veterans' Affairs offer an excellent opportunity to carry out studies on selected series of cases, for several reasons. Complete and continuous records, including service documents and previous histories, are available on all patients. In addition, the personnel concerned in the investigation recorded a standard history and examination. The patients had a similar background, as almost all of them were healthy young males, who had previously been considered fit for active service. They were under no economic strain during investigation and treatment, and conservative measures could be given a thorough trial. Excellent facilities were available for physiotherapy and physical training.

The personnel carrying out operative treatment was constant throughout the series, and a similar technique was used in all of the operations. There was ample time for convalescence, and a natural desire in most of these veterans to become rehabilitated to civilian occupations.

Patients undergoing non-operative therapy were on the same wards, and in close contact, with the postoperative cases so that individuals were able to compare the results of treatment among themselves. Two cases included in the non-operative series at the first review, have since been operated upon, both with positive findings.

It was felt that a follow-up on patients with disc lesions was necessary, to assess the results of surgical and non-surgical measures, in view of the large number of cases still requiring treatment. It might be reasonable to suggest that these cases are comparable to civilian patients treated under compensation or insurance benefits, and were not likely to minimize their complaints or exaggerate their improvement. Grant[2] has pointed out the discrepancy in the results of operations in series of compensation and non-compensation cases.

We have been fortunate in having the assistance of other departments at the Treatment Centre in the investigation of our patients. Most of the cases were seen by the arthritic service, the Department of neuropsychiatry, and almost all by the Department of Orthopædics. There has been the closest co-operation and consultation with the orthopædic specialists: one result of this collaboration has been the policy of primarily exploring for disc lesions, and not considering the combined or fusion operation until the result of the disc operation could be assessed. From the outset, a conservative attitude toward surgical treatment was adopted—only cases with severe and recurrent attacks of sciatica were selected for operation. Thus, the cases operated on were the more seriously disabled.

The criteria for the establishment of the diagnosis of an intervertebral disc lesion were the same in both series. Pantopaque myelography was carried out in the great majority of cases, both as a confirmatory and localizing measure, and also to provide a permanent visual record of the lesion. Though not infallible, myelography has shown a high degree of accuracy.

The questionnaire method of follow-up was adopted, although many cases in both series were examined personally while the review was being conducted. On every occasion on which the patient was personally examined, our impression of the result of treatment was somewhat better than that recorded by the patient in his reply. The questionnaires were made as simple as possible in order to eliminate the possibility of equivocal answers.

During the twenty-month period under review, 337 cases were referred for examination as possible prolapsed discs. Of this number, 116 were not typical, leaving a balance of 221 who were considered probable disc lesions. Of these, 80 were operated on, and 70 are reviewed. The remaining 10 were not available for review at the preliminary 18-month report, but we have been very fortunate in being able to continue the follow-up on the 70 previously surveyed.

Of the 141 cases continued on non-operative treatment, complete records were available on 111, and questionnaires to these patients resulted in 64 answers at the 18-month period, and 63 answers at the three-year period. It is apparent that there is a discrepancy in the percentage of replies obtained in the two series. In explanation of this, it may be that the patients not operated on having discomfort or disability were more interested in answering the questionnaire than those who were comparatively well.

In attempting to assess our results, we feel that there were two factors of prime importance: firstly, relief of symptoms; secondly, and even more important, ability to work. An attempt has been made to analyze the cases on this basis. Among several factors common to the two series, the age incidence might be mentioned. The average age of the operative cases was 30.3 years, and the average of those continued on non-surgical treatment was 35.7 years. As might be expected, the age incidence is higher in the non-operative patients. Five were over 50 years of age, and two of these were over 60.

The average duration of symptoms in the operative series was 19 months. This is an indication that conservative measures were given a fair trial before surgery was undertaken. In the non-operative series, the average duration of symptoms was 15.3 months.

The average review interval is 36.2 months in both series. It is felt that this has allowed sufficient time for these veterans to become reestablished in civilian occupations. A proportion of them had never had the opportunity to work at any steady employment in the pre-

enlistment period. Therefore, in many cases the ability to work cannot be compared with any previous occupation. It should be noted that all the postoperative cases are working.

Our experience with the site of lesion has been similar to those reported in larger series, showing an incidence of 96% occurring at the fourth or fifth lumbar space. There were two cases of marked lesions at both the fourth and fifth lumbar spaces. Three patients (4%) had disc lesions at the third space.

The surgical technique employed might be briefly mentioned. All patients were operated on under spinal anæsthesia, lying on the unaffected side. A unilateral exposure was made, for the removal of the ligamentum flavum and sufficient adjacent lamina to allow an adequate exposure of the nerve root and intervertebral disc. Where a protrusion was encountered, the interspace was opened and thoroughly curetted. If there was no definite protrusion seen or felt, the posterior longitudinal ligament was left intact, and the nerve root decompressed as completely as possible. In 13 cases (17.5%), both the fourth and fifth spaces were explored. This was done in those cases where the findings at operation were indefinite at one or other space.

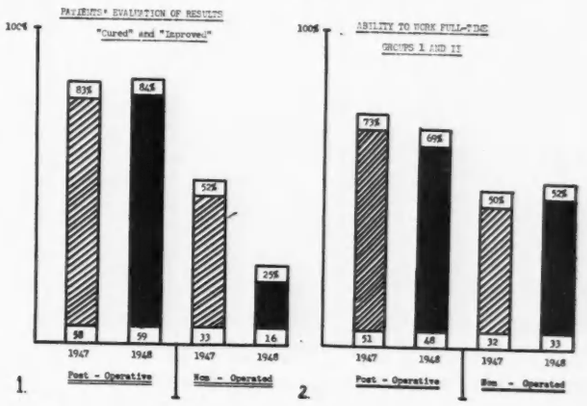
With regard to after-treatment, the patients were allowed up as soon as they felt able, and were started on exercises during the first week. In the majority, postoperative convalescence was continued for three months.

Patients' evaluation of results.—As previously stated, the patients were asked to evaluate the results of their treatment, and were assured that their answers would not influence any pension entitlement. In spite of this, we feel that the average patient was not likely to exaggerate the degree of his improvement. According to the answers obtained, 84% of the operative cases reported that they were either "cured" (13%) or "improved" (71%) as compared to "cured" (0%) and "improved" (25%) in the non-operative group. We feel that the patients' own evaluation is particularly significant in the operative series. Those not operated on, if not suffering, probably did not take the trouble to answer the questionnaire.

We would like to call attention to the number "not improved" in the operative series. It will be shown later, in our analysis of the questionnaires that this figure (16%) corresponds very closely to the number losing a considerable amount of time from work.

In all the following graphs, the number of cases are shown at the foot of the column, with the equivalent percentage of the appropriate series at the head. The shaded columns represent the figures in June, 1947, and the solid black columns show the corresponding figures in December, 1948.

Ability to work.—For purposes of analysis, at the 18-month review, the cases were divided into three groups on the basis of ability to work. Group I represented those working full-time, with no pain. Group II those working full-time, with minor pain, and Group III, those losing time from work because of pain. For practical purposes, Groups I and II can be combined since they are working full-time.



As will be seen by Table 2 at the 18-month period, 73% of the postoperative cases were working full-time, and this has slightly deteriorated to 69%. The corresponding figures for the non-operative series are also shown. The balance of postoperative cases, *i.e.*, those losing time from work amounts to 31%, or a total of 22 cases.

Closer examination showed the reason for loss of time to be mainly low back pain, which is complained of in all these cases, while 10% (7 cases) still have some residual sciatica of varying degrees. Investigation of the amount of time lost indicates that half are losing occasional days, while the remaining 11 cases (15.5%) are losing considerable time from work, amounting to an average of more than two weeks in one year. These latter, we feel, are the disappointing results of our series, and we have made an attempt to study them more fully to determine whether there is any obvious explanation.

The features that we considered important were: firstly, the physical findings, with particular reference to abnormal neurological signs; secondly, the myelographic signs; thirdly, the operative findings.

There is a relatively high incidence of nerve root involvement in this group. Seven had abnormal neurological signs. The remaining four

ANALYSIS of DISAPPOINTING RESULTS - 1948
(11 Cases)

Case No.	1 P	2 P	3	4	5	6	7 P	8 P	9	10	11
Abnormal Neurologic Signs	+	+	+	+	+	+	+	?	?	0	0
Myelogram	+	+	+	0	0	0	0	+	+ +	+	+
Operative Findings	0	++	+ +	0	++	+	+	++	+ +	+	+

\+ Positive findings.
? Doubtful findings.
0 Negative findings.
+ + Positive findings at 4th and 5th spaces.
+ + Extruded disc.
P History of psychoneurosis.

Table 3

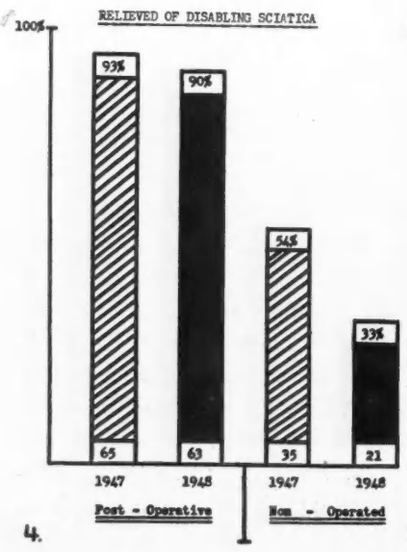
all had positive myelograms and positive findings at operation. The myelogram on Case 9 was suggestive of disc lesions at both the fourth and fifth spaces. There were two negative explorations, both cases having abnormal neurological signs, and one having also a positive myelogram.

We are impressed by the severity of the disc disease found in this group. Cases 3 and 9 had discs at two spaces, while cases 2, 5, and 8 had extruded discs. It was of interest to note that cases 1, 2, 7, and 8 had an associated history of psychoneurosis, and of these, all but one had marked disc lesions. All complained of residual low back pain, and cases 1, 7, 8, 9, and 10 also complained of residual sciatica. Two patients (2 and 11) have since undergone spinal fusion but this procedure has been carried out too recently for evaluation.

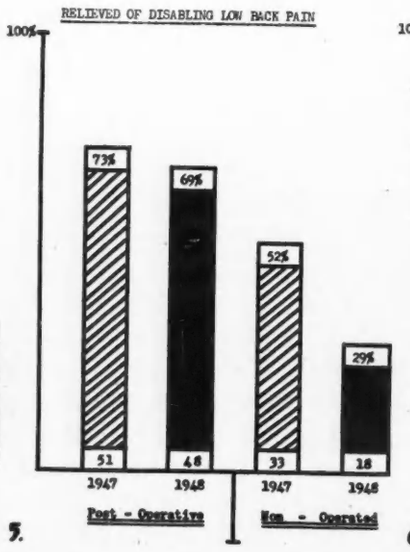
We find it difficult to draw any definite conclusions from this analysis, except to suggest that some cases had such marked disc disease that irreversible changes may have occurred in the mechanics and function of the lumbar spine. In other words, although we are in favour of a conservative attitude toward disc operation, in patients where definite nerve root involvement is found, if the response to conservative treatment is not satisfactory, the results might be improved by earlier operation.

Relief of symptoms. — Our experience has shown that one can promise a high percentage of benefit in regard to relief from the symptom of sciatica; 93% of the postoperative patients reported relief at the 18 month review, and 90% at the three-year follow-up. This corresponds very closely to reports of other series of cases. In comparison, as shown in Table 4, the relief from this symptom in the non-operative group shows marked deterioration between the 18 and 36 month interval.

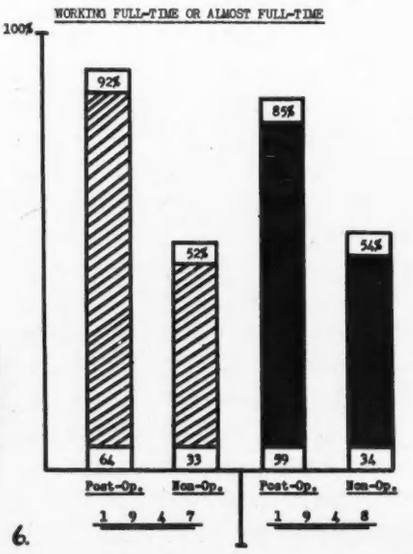
With regard to the relief of disabling low back pain by operation, Table 5 shows that 73% have reported relief at the 18-month review, while this figure has deteriorated slightly



4.



5.



6.

at the three-year period to 69%. It is interesting to note that this is the same figure as those who are able to work full-time in both the 18 and 36 month follow-ups (Table II).

The non-operative cases have deteriorated as shown by their own answers to questionnaires —from 52 to 29%.

In conclusion, we have grouped all those working full-time or almost full-time (Table 6), and find that at the present review, 84.5% of the operative cases fall into these categories. This is in contrast to 54% of the non-operative series. The residual—15.5% of disappointing results have been more fully described above.

DISCUSSION

Our findings suggest that reasonably good results can be expected in operating for disc lesions in cases that are carefully selected following a thorough trial on conservative treatment. This is especially true in regard to the relief from disabling sciatica.

Residual low back pain of varying degrees remains the problem still unsolved. It is suggested that mechanical derangement of the back in long-standing cases of disc disease may have some bearing on this complication. In view of the large percentage of cases who present themselves with marked flattening of the lumbar spine and muscle spasm, it is perhaps too much to expect that the treatment of one, or even two local lesions would be sufficient to restore normal function. At the first review,[1] it was hoped that there would be a reduction in this residual symptom with the further lapse of time, but this has not been borne out.

As previously stated, we still favour primarily exploring for disc lesions, and considering the indications for spinal fusion at a later date. It is noted that this is similar to the conclusion reached by Spurling,[3] reporting a follow-up on a larger series of operative cases. We feel that the figure of 84% classifying themselves as "cured" or "improved" by their own evaluation, and by our analysis 84.5% working full-time or almost full-time, helps to justify this conclusion.

This follow-up has given us material help in the selection of later cases for surgery, and in giving a reasonable forecast of the results to be expected in any particular case.

SUMMARY

1. A three-year follow-up on 70 postoperative discs in veterans is reported, using a control series of 63 non-operative cases.

2. It is concluded that surgical treatment for lumbar disc lesions offers a high percentage of relief from disabling sciatica.

3. It is suggested that the symptom of persistent postoperative low back pain may be due to mechanical derangement of the lumbar spine by prolonged severe disc disease.

REFERENCES

1. WAUGH, O. S. *et al.*: *Treat. Serv. Bull.*, Department of Veterans' Affairs, Ottawa, Canada, **11**: 10, 1947.
2. GRANT, F. C.: *Ann. Surg.*, **124**: 1066, 1946.
3. SPURLING, R. G. AND GRANTHAM, E. G.: *J. Neurosurg.*, **6**: 57, 1949.

THE DIAGNOSIS OF PULMONARY EMPHYSEMA

A. Bogoch, M.D. and J. E. Walker, M.D.

Department of Medicine,
Shaughnessy Hospital, Vancouver, B.C.

THE diagnosis of chronic vesicular (hypertrophic, obstructive) pulmonary emphysema is often difficult to make except in its advanced stages. Since the days of Laennec, more than one hundred years ago, there has been much disagreement regarding its etiology and pathogenesis, and a marked discrepancy between clinical and pathological diagnoses has been frequently noted.[1] In addition to the need for adequate treatment of emphysema and its underlying cause, the importance of its recognition lies in the differentiation from other causes of dyspnœa, especially certain pulmonary disorders, cardiac disease and obesity. Earlier diagnosis would also be of great significance in preventive medicine, in view of the large number of people in modern industry who are exposed to the injurious effects of lung irritants with resulting degrees of pulmonary fibrosis and emphysema.

In this article we are not concerned with acute vesicular or acute interstitial emphysema; nor with senile ("small lung") emphysema in which atrophy of lung tissue is associated with senescence and degeneration, and a barrel-shaped chest which is usually associated with a stiff and later kyphotic thoracic spine. The senile type is characterized by normal diaphragmatic excursion and does not

usually cause symptoms during the larger part of its course. Compensatory emphysema is probably a physiological reversible process in which distension of healthy pulmonary tissue occurs to compensate for temporary loss of functioning lung as may occur in pneumonia, atelectasis or other conditions. However, if the pathological condition is long continued, or for example, if pulmonary fibrosis occurs, the irreversible changes of chronic vesicular emphysema may supervene.

Chronic vesicular "large lung" emphysema exists where there is an increased volume of the lungs due to abnormal distension of alveoli, with stretching, thinning, and rupturing of many of the alveolar walls, loss of pulmonary elasticity, and with the formation of superficial blebs and bullæ. Capillaries are torn and obliterated, reducing the pulmonary capillary bed and arteriosclerotic changes usually follow in the pulmonary arteries. The result may be an increase in the pulmonary blood pressure and dilatation and hypertrophy of the right ventricle, so that many cases are complicated by right heart failure.

Pathogenesis. — Pulmonary emphysema has been produced experimentally in dogs by either partial inspiratory or expiratory tracheal obstruction.[2] Although at a loss to explain why some patients with chronic bronchitis or asthma develop emphysema comparatively rapidly, while others never become emphysematous, most observers agree that diseases which tend to narrow the lumen of the air passages, *i.e.*, chronic bronchitis from any cause, bronchial asthma, etc., are important in the production of chronic vesicular emphysema. However, disagreement exists as to whether the stresses which produce the changes occur during inspiration or expiration.[3, 4, 5] Acting against chronic or intermittent partial bronchial obstruction, expiration, normally a passive act due to the elastic recoil of the lungs, is not as forceful as inspiration even when aided by the accessory respiratory muscles. It is likely that as a result of difficult, prolonged and often incomplete expiration, and/or of an impairment in the elastic elements of the lungs due to infection or unknown cause, the lungs may in time become gradually and abnormally distended. If moderate distension is maintained, stresses such as coughing or straining, which increase the intrapulmonary pressure[6] may advance the pathologic process.

Pulmonary emphysema has also been produced experimentally by shortening the diaphragm and thereby increasing the capacity of the thoracic cage.[2] This is comparable to clinical cases in which a permanent reduction of pulmonary tissue, such as occurs in diffuse pulmonary fibrosis, is followed by emphysematous changes in the remaining functioning lung.

Some cases develop rapidly in previously healthy individuals several months after atypical pneumonitis, or bronchopneumonia due to influenzal bacilli or to an undetermined type of infection.[7] To explain the unusual cases of chronic vesicular emphysema in which there is no preceding history of respiratory disease, it has been suggested[3] that very rarely the stress and strain on the lung which occurs with ordinary breathing may be sufficient to destroy its elasticity. Mal-developments of the lung may predispose to its occurrence, but a hereditary tendency to emphysema is generally denied. Emphysema is not an uncommon complication of pulmonary arteriosclerosis.[4]

Clinical findings. — The onset and development of emphysema is usually insidious, the lesions often being well advanced before symptoms become apparent, but once established it may overshadow the underlying disease. For purposes of diagnosis and prognosis, the disease may be roughly divided into three stages. The early compensated stage may persist unrecognized for years, only to be followed by the stage of inadequate compensation in which symptoms and signs of either pulmonary or cardiac insufficiency occur in combination, with either predominating. The terminal stage of decompensation may be maintained for a variable length of time, but usually prevails a matter of weeks, and death often occurs during an attack of extreme pulmonary insufficiency, or is due to intercurrent bronchopneumonia.

In the large majority of cases of chronic vesicular emphysema there will be symptoms of a primary underlying disease and the two most common symptoms of the underlying condition are chronic cough and attacks of asthmatic breathing. Shortness of breath on exertion may also be a symptom of the underlying disease itself, or of emphysema, in which,

because of the lack of normal pulmonary ventilation, it is the most constant and conspicuous symptom. Dyspnœa on exertion, mild at first, aggravated by cold air and worse in the winter, usually progresses slowly until it may occur at rest. Characteristically, emphysematous patients can assume the recumbent position without causing an increase in shortness of breath. Attacks of dyspnœa occur in patients with emphysema, and while some are due to the underlying disease, *i.e.,* bronchial or cardiac asthma, others may be due to the cardiovascular disease which may complicate emphysema. Pre-existing chronic bronchitis usually becomes more severe as the emphysema progresses, and chronic bronchitis is also often a complicating feature in cases in which it is not pathogenetically related. The disturbing cough tends to be paroxysmal and unproductive at first, and is aggravated by effort, irritants and cold air. Repeated attacks of acute bronchitis or bronchopneumonia are common aggravating occurrences. Because of the interference with oxygen exchange, cyanosis is also a prominent symptom of chronic vesicular emphysema. Moderate cyanosis of the lips, lobes of the ears, and extremities often follows exertion, and may become extreme in the later stages.

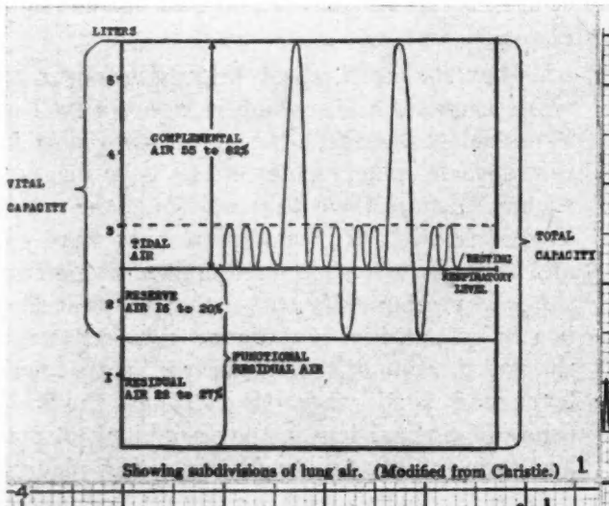
There is much divergence of opinion among clinicians as to the reliable signs of emphysema. Christie[3] believes that the signs of emphysema are unreliable, that they may be absent in patients suffering from the disease, and are not uncommonly present in patients without emphysema. He also feels that a history of chronic cough or asthma associated with dyspnœa on exertion, is a more reliable guide to the diagnosis than physical signs. However, a correct diagnosis depends on an alert awareness, and on the impression gained by a proper correlation of a detailed history, physical signs, and limited laboratory aids.

In the decompensated stage, the breathing may be accelerated and laboured, with expiration considerably prolonged and active, bringing the accessory muscles of respiration into play. There is little outward flaring of the lower ribs on inspiration, and the thoracic cage which is already in a partial inspiratory position, usually moves upwards and forwards in a heaving "cast-like" manner. Although measurement of chest expansion by means of a tape measure may bear little relation to the vital capacity, an expansion of less than 1½" is usually significant. A barrel-shaped chest is often considered by many to indicate the presence of emphysema. When it occurs in chronic vesicular emphysema, it probably results from expansion of the lung due to loss of elasticity, the expansion of the lung between heart and sternum, and dorsal kyphosis.[3] However, it should be stressed that a barrel-shaped chest *per se* may be of little significance. There are several degrees of this deformity which are often difficult to distinguish from the normal, and from the chest of a hypersthenic body type especially if the patient be middle-aged and obese.

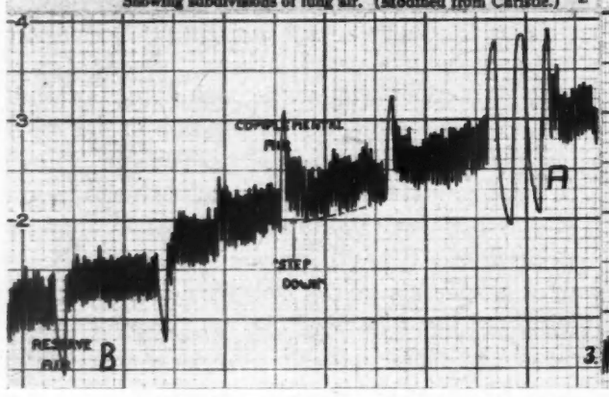
A barrel-shaped chest may also occur in senile emphysema in which it is considered to be associated with a degenerative process in the thoracic spine, or may result from diseases such as spondylitis or tuberculosis of the spine. Tactile fremitus is normal or may be reduced, and there is often hyper-resonance to percussion. It is frequently stated that the first sign in emphysema is a low diaphragm. Although the mid position of the diaphragm is at a lower level than usual, when one considers the wide range of normal levels, the variability of size and types of chests, the difficulties in placing definite landmarks, and the minimal radiologic evidence as discussed below, this sign is of little practical diagnostic value in the individual case. However, percussion of the right chest anteriorly often discloses hepatic dullness to be diminished. Percussion posteriorly will also reveal very valuable evidence in that the excursion of the diaphragm is definitely reduced, and this fact is well borne out by radiologic studies described below. In moderately advanced cases there may be an absent visible or palpable apical impulse, loss of cardiac dullness, and distant heart sounds. The breath sounds are usually reduced, especially at the bases, and vocal resonance is sometimes decreased. A most important and perhaps the earliest physical sign is the prolonged expiratory breath sound which is probably due to loss of pulmonary elasticity or to bronchospasm. The expiratory sound may be partially or entirely replaced by high-pitched or wheezing rhonchi. Adventitious sounds are due to bronchitis or other associated conditions. Signs of right heart failure may be present.

Laboratory studies.—Several laboratory tests have been used in an attempt to obtain a practical laboratory aid in the diagnosis of this disease. Pneumatometry, the pneumometer, stethograph, pneumograph and polygraph were rapidly discarded.[8] Almost one hundred years ago, Hutchinson and Wintrich[8] used a spirometer in their pioneer investigations, and found that the capacity of the lung in emphysema was considerably diminished. A vital capacity determination is a good measure of expansile capacity and does furnish a rough index of the severity of a case of emphysema. At any age, a vital capacity of less than 60% of the normal standard, as calculated from the surface area, or less than 75% in individuals under 50 years of age is significant.[9] As a rough guide, a vital capacity under 3,000 c.c. in an adult should be considered abnormal.

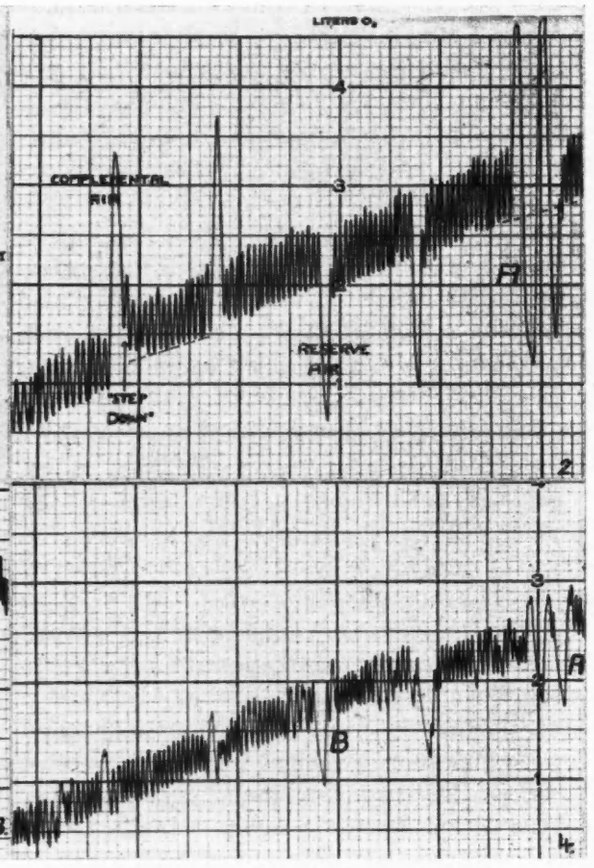
It has been shown[11, 12] that a very constant relationship exists among the subdivisions of the total capacity, as is illustrated in Fig. 1 taken from Best and Taylor.[13] That the residual air is usually increased in emphysema has been noted by several investigators.[14, 15] Christie[16] found that the ratio of functional residual air to the total capacity was most instructive, since instead of averaging 38% as in normal males,



Showing subdivisions of lung air. (Modified from Christie.) 1



3



2 4

Fig. 2.—Tracing of S.P., aged 45, with no respiratory disease. Note the "step down" to a constant level in 4 breaths after the first recording of complemental air. **Fig. 3.**—Tracing of a patient with moderately severe pulmonary emphysema. R.D., aged 44. Attacks of bronchial asthma and chronic cough productive of clear sputum, followed coryza with acute bronchitis in 1941. Dyspnœa increased gradually so that at present, climbing one flight of stairs causes shortness of breath. "Typical" physical signs present. Chest expansion poor (36¾ to 37½"). P-A chest x-ray normal, but maximum inspiratory and expiratory films confirmed percussion findings of moderately diminished diaphragmatic excursion. Vital capacity 1,800 c.c. This tracing shows the most marked "step down" changes seen in our cases, the respirations "stepping down" to a constant level in 6 breaths. The reserve air after forced inspiration (A) is greater than the reserve air following quiet breathing (B). **Fig. 4.**—Tracing of a patient with severe pulmonary emphysema. H.B., aged 49. Mildly productive chronic cough since 1917. Exercise tolerance excellent in 1939. Attacks of asthmatic breathing began in June, 1946, and chronic cough increased in severity. At present he cannot walk 1 block without shortness of breath. Physical signs of advanced disease are present, chest expansion is very poor (37 to 37½"), and diaphragmatic excursion is markedly restricted. Vital capacity 1,050 c.c. No "step down" phenomenon present. There is a slight reduction in reserve air following maximum inspiration (A), as compared to reserve air taken following quiet breathing (B).

it ranged between 70 to 79% in emphysematous males. "In other words, the emphysematous subject breathes at a level which is only 20 to 30% below full chest expansion."[16]

That loss of pulmonary elasticity is a prime feature in pulmonary emphysema was demonstrated by Christie[3] who showed that the intrapleural pressure, which is a direct measure of the elastic recoil or tension of the lung, is not always negative as it is in health, but approaches that of the atmosphere. This change has been confirmed by Paine.[10]

By means of a recording spirometer of the type used in testing basal metabolism rates, in 1934, Christie[16] reported that it was possible to estimate the loss of pulmonary elasticity, by what he termed the "overdistension test". "If a normal individual be instructed to take a deep breath, he will subsequently expire all, or almost all of the air inspired returning to his previous respiratory level. In other words, there is no demonstrable "set" when the lungs are distended by a deep inspiration. In most early, and all advanced cases of emphysema, the lungs are overstretched when the subject inspires deeply, with a consequent failure of the next expiration to return to its previous respiratory level. A new level may be adopted, the lungs being more distended than before, but usually the respirations "step down" until a constant level is reached in the space of 12 breaths or more. The same phenomenon may be observed on deep expiration; this can only be due to overstretching of lungs, the elasticity of which is impaired. This overstretching or overdistension can be made more obvious if the patient be told to expel a sample of reserve air immediately after the forced inspiration. Since the lungs have been overdistended, this sample of reserve air is much smaller than one taken after a period of quiet respiration. A slight discrepancy between the reserve air taken in these two ways is occasionally observed in normal individuals, whereas in emphysema a marked difference is the rule rather than the exception." More recently Christie[3] reported that these findings occur in only about 50% of cases of emphysema, that most of the others give tracings which are suggestive, and the suggestive tracings are present in only a very small number of normals. According to Meakins,[17] this procedure will give almost certain proof of the existence of emphysema. Christie[16] also noted a decrease in the volume of the complemental air, a diminution or even disappearance of the reserve air, and a fluctuation of the resting respiratory level in emphysematous patients.

We have performed this test in 41 patients. Of this number, 24 were in the fourth decade and of these, 8 were considered to have moderate or severe pulmonary emphysema, two had slight emphysema, 3 had only chronic bronchitis, and 11 had no symptoms or signs of respiratory disease. The tests were performed on the same spirometer, by one technician who employed a specific set of instructions which included a practice trial. As may be noted in Fig. 2, after a period of normal breathing the patient is asked to inspire as deeply as possible (complemental air), and at the height of inspiration he is instructed to "breathe normally". The same procedure is repeated. After a period of quiet respiration the maximum expiration (reserve air) is then determined and repeated, and is followed by recording the vital capacity. Thus from the tracing, one may determine the tidal air, complemental air, "step down" phenomenon, reserve air, and the vital capacity. In addition, the reserve air immediately after a forced inspiration (A) may be compared to the reserve air following normal breathing. After a careful evaluation of the results obtained in the 24 cases noted above, and in 17 others in other age groups, we have failed to corroborate the findings of the over-distension test reported by Christie.[16] We have found that the "step down" phenomenon described occurs equally in both emphysematous and normal persons, and that the reduction in complemental and reserve air is almost in direct proportion to the diminution of the vital capacity. No difference in the fluctuation of the resting respiratory level was observed between the emphysematous and control groups. Representative tracings are shown in Figs. 2, 3 and 4.

Because of the extensive anatomic changes which occur in emphysema, there is a deficiency in oxygen absorption and carbon dioxide elimination, as shown by a diminished oxygen saturation of the blood, and increased carbon dioxide content of both arterial and venous blood. In severe cases a compensated gaseous acidosis with an abnormally high CO_2 combining power may occur. The factors contributing to the impaired hæmo-respiratory exchange

have been discussed by Christie.[1] Compensatory polycythemia is common.

FLUOROSCOPIC AND RADIOLOGIC FINDINGS

Fluoroscopic examination may reveal an increased aeration of the lungs, and Fray[18] has noted that whereas normally the lung bases in maximum expiration have an almost airless appearance, the increased residual air of the emphysematous lung maintains the translucency of the bases and costophrenic sinuses. The normally rounded contour of the diaphragm may appear flattened, but most important is the greatly restricted mobility of the diaphragm usually found in moderate and severe cases.

In our experience, routine radiographs of the chest are of limited value in the diagnosis of emphysema. P-A films may reveal trans-

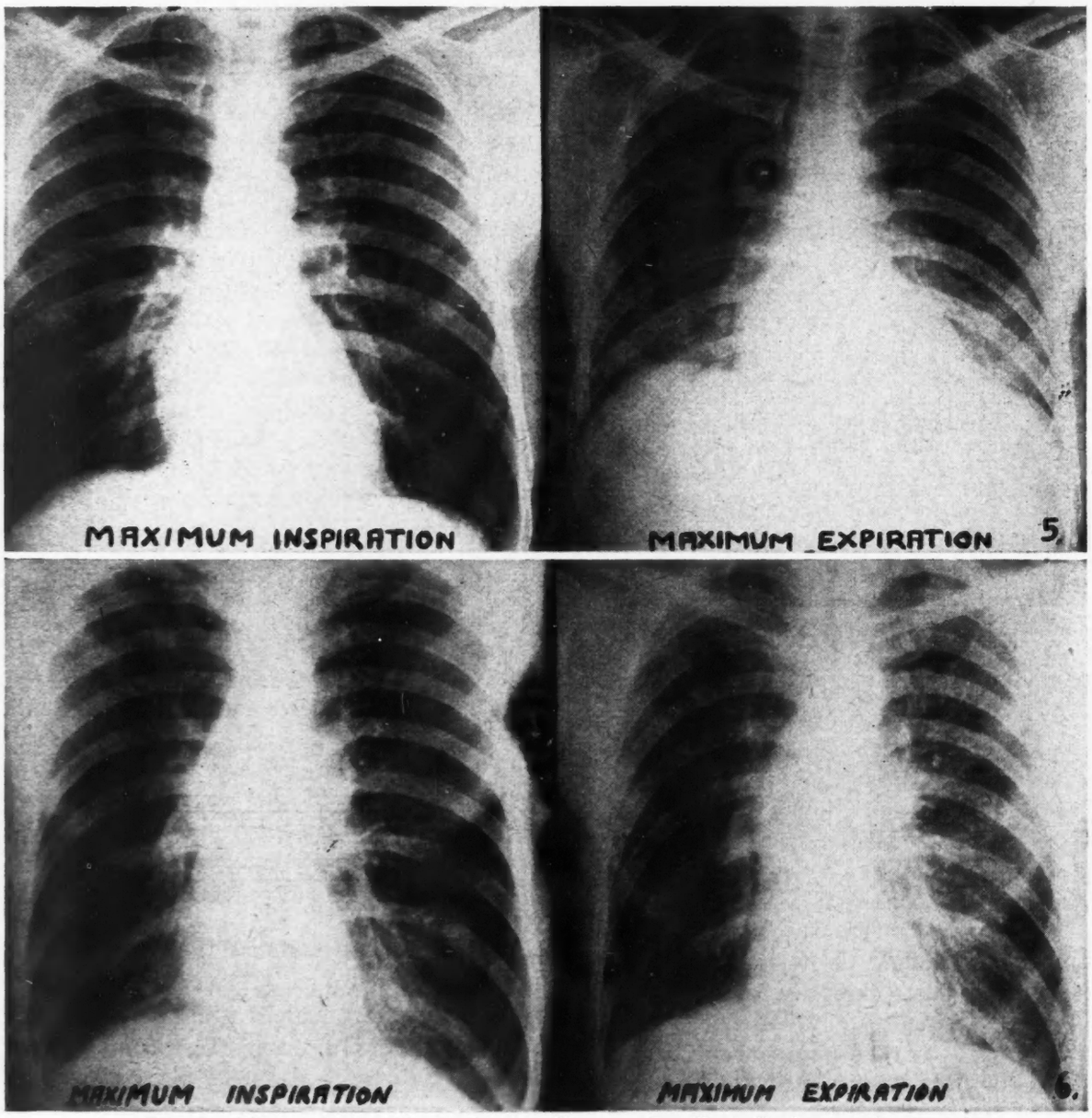


Fig. 5.—S.P., aged 45. No respiratory disease. Excellent diaphragmatic excursion. Note "low" diaphragm in 11th interspace, and hyperillumination of bases in P-A inspiratory film. **Fig. 6.**—I.W., aged 41, had coryza with acute bronchitis for 2 weeks in 1941 and again in 1942 following which cough became chronic. Exercise tolerance decreased gradually. At present he has chronic cough productive of 8 oz. of white or yellowish-green sputum daily. On physical examination there is diminished diaphragmatic excursion and expiratory breath sounds are prolonged. Chest expansion 35 to 36½". Vital capacity 2,300 c.c. Note diaphragmatic excursion is poor. Diaphragm in inspiratory film is at the same level as in the subject with no respiratory disease (Fig. 5) but diaphragm is very much lower than in normal subject in the films taken in maximum expiration.

parencies cast by blebs or bullæ at the outer lung fields, particularly at the bases; and increased contrast causing the hilar markings to appear accentuated in comparison to the abnormally clear lung. However, the presence of hyperillumination of lung fields ("black lungs") has to be carefully assessed in view of the technical factors and errors involved. A low diaphragm is often considered to be a reliable radiologic sign of emphysema. The different chest types, the wide range of normal values and the possible technical errors, such as the variable phases of respiration in which films are taken, makes this observation a very poor diagnostic aid. Although a very low diaphragm, *i.e.*, below the 12th rib in the midclavicular line is occasionally seen in inspiratory P-A films of very severe emphysematous patients, by far the larger number of cases of emphysema will show no lower diaphragmatic levels than normal subjects. This was well demonstrated in the 24 patients discussed above in whom radiographs of the chest were taken in complete expiration and in complete inspiration. Examples of these observations are seen in Figs. 5, 6 and 7. In a recent report of radiographic determination of diaphragmatic levels in 58 subjects, Grossman and Herzheimer,[19] using a method described by Warner and Doidge,[20] found the diaphragm to be lower than normal in cases of moderate and severe emphysema. However, of the 58 tested, 8 normal subjects were students, and because of the likely age difference were poor controls. It would appear that if the diaphragmatic level is to be used as a diagnostic sign, P-A films in expiration might possibly give more reliable information. Much more important than diaphragmatic level is the diminished excursion which is very common in cases of moderate and severe emphysema. In patients with slight emphysema, diaphragmatic excursion may be normal.

Lateral films may reveal an increased air space between the heart and sternum and between the heart and spine caused by distended lung tissue. As has been noted above, a barrel-shaped chest does not always indicate emphysema, and the direction of the ribs and width of the intercostal spaces is of little or no value in the diagnosis. O'Donaghue[21] has reported that by intratracheal injection of lipiodol, it is possible to clearly demonstrate alveolar disorganization and destruction.

SUMMARY

1. Some of the difficulties and discrepancies in the diagnosis of pulmonary emphysema have been noted.

2. An alert awareness, and a proper consideration and correlation of symptoms and signs

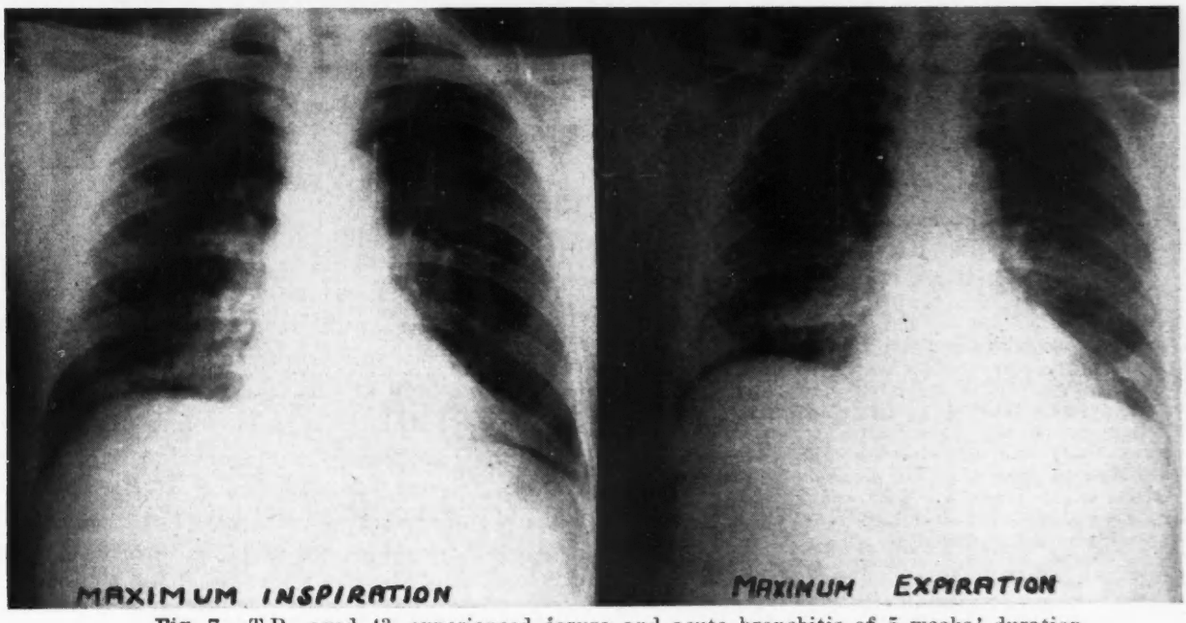


Fig. 7.—T.P., aged 43, experienced coryza and acute bronchitis of 5 weeks' duration in 1941, followed by several bouts of bronchitis in 1942 and in 1943, when cough became chronic. Dyspnœa on exertion began in 1945, and has progressed gradually so that at the present time he cannot climb one flight of stairs. Attacks of asthmatic breathing began in 1945. Physical examination reveals signs of moderately severe emphysema. Chest expansion is poor (37½ to 38½"). Vital capacity 1,500 c.c. Note poor diaphragmatic excursion. Diaphragm is not low but at a slightly higher level than in the normal subject.

will result in the diagnosis being made more frequently.

3. Vital capacity recordings furnish a good measure of the expansile capacity of the lung and a rough index of the severity of a case of emphysema.

4. We have failed to confirm the findings of the "overdistension test" reported by Christie.

5. Routine radiographs of the chest are of limited value in the diagnosis, but the demonstration of decreased diaphragmatic excursion is very significant.

Our thanks are due to Dr. M. M. Baird, Director of Medicine. Also to Dr. J. Stevenson, of the Department of Radiology, and to Mrs. F. Baker who performed the spirometric tests.

REFERENCES

1. CABOT, R. C. AND ADAMS, F. D.: Physical Diagnosis, Williams and Wilkins Co., Baltimore, 473, 1939.
2. PAINE, J. R.: *Thoracic Surg.*, **10**: 150, 1940.
3. CHRISTIE, R. V.: *Brit. M. J.*, **1**: 105, 143, 1944.
4. MOSCHCOWITZ, E.: *J. Mt. Sinai Hosp.*, N.Y., **13**: 90, 1946.
5. WILSON, J. L. AND FINDLEY, T.: *Med. Clin. N. Am.*, 356, March, 1944.
6. KOUNTZ, W. B. AND ALEXANDER, H. L.: *Medicine*, **13**: 251, 1934.
7. BARACH, A. L.: *Am. Pract.*, **2**: 771, 1948.
8. HOFFMAN, F. A., ROSENBACH, O. AND AUFRECHT, E.: Diseases of the Bronchi, Lungs and Pleura, Nothnagel's Encyclopædia of Practical Medicine, American Edition, W. B. Saunders & Co., Philadelphia and London, 1903.
9. RUBIN, E. H.: Diseases of the Chest, W. B. Saunders & Co., Philadelphia and London, 1947.
10. PAINE, J. R.: *J. Thor. Surg.*, **9**: 550, 1940.
11. MEAKINS, J. C. AND CHRISTIE, R. V.: *Ann. Int. Med.*, **3**: 423, 1929.
12. HURTADO, A. AND BOLLER, C.: *J. Clin. Invest.*, **12**: 793, 1933.
13. BEST, C. H. AND TAYLOR, N. B.: The Physiological Basis of Medical Practice, Williams and Wilkins Co., Baltimore, 4th ed., 1944.
14. CHRISTIE, R. V.: *J. Clin. Invest.*, **11**: 1099, 1932.
15. HURTADO, A., FRAY, W. W. AND MCCANN, W. S.: *J. Clin. Invest.*, **12**: 833, 1933.
16. CHRISTIE, R. V.: *J. Clin. Invest.*, **13**: 295, 1934.
17. MEAKINS, J. C.: The Practice of Medicine, 4th ed., C. V. Mosby Co., 209, 1944.
18. FRAY, W. W.: *Am. J. Roentgenol.*, **32**: 11, 1934.
19. GROSSMAN, M. AND HERZHEIMER, H.: *Brit. J. Radiol.*, **21**: 446, 1948.
20. WARNER, W. P. AND DOIDGE, V. A.: *Trans. Am. Clin. & Climat. Ass.*, 52, 1939.
21. O'DONAGHUE, J.: *Am. J. Roentgenol.*, **40**: 863, 1938.

We of the medical schools carry no banner for any scheme of socialized medicine. We suspect that social and asocial medicine are but extremes. Some group is "Going to do something about it" and we shall have in some degree a new setup, no doubt with good and bad features. We of the medical schools shall not dictate all the terms. Whether or not we agree, we shall have to adapt ourselves to the result.

Under any plan, everyone will suffer if the wrong men enter the profession. The membership will never be perfect. . . . The attractions and appeal of medicine will be altered with a change in the management of medical problems. The type and quality of men and women seeking to get into medicine will change accordingly. The fabric of the profession, the cloth from which the new styles are to be cut, for better or for worse, is within the jurisdiction of those of us in medical schools. We can ignore the change, thereby bidding for trouble, or we can prepare for it, thereby helping to retain the more basic professional standards in the face of forces strong enough to submerge them. This preparation is our problem and our responsibility.—M. S. Marshall, *J. Am. M. Ass.*, **24**: 100, 1949.

STERILIZATION OF PLASTER OF PARIS BANDAGES

R. J. Gibbons, M.D., D.P.H.

Department of Bacteriology and Preventive Medicine

and

J. Burke Ewing, M.D., F.R.C.S., F.R.C.S.[C.], F.I.C.S.

Department of Surgery, University of Ottawa and the Ottawa General Hospital, Ottawa, Ont.

MURRAY and Denton's report[1] of a fatal case of tetanus attributed to infection of a wound from a plaster of Paris cast and the finding of Clostridia and other pathogenic micro-organisms in a high percentage of plaster of Paris bandages by Murray and Denton and by Greenberg[2] prompted the present attempt to provide sterile plaster bandages for our hospital.

STERILIZATION BY DRY HEAT

With the bandages at our disposal (two well known commercial brands) we were unable to obtain a satisfactory product following sterilization by dry heat as described by either Murray and Denton or by Klotz.[3] In each instance, although the prescribed time and temperature were closely followed, using a thermostatically controlled oven and a thermometer inserted into the container, the fabric was discoloured and weakened and the hardening quality of the plaster bandages so impaired that the surgeon (J.B.E.) found them unsuitable for routine use.

Treatment at a lower temperature and in sealed containers to minimize desiccation was undertaken. Bandages in sealed containers were slowly brought to a temperature of 160° C. to allow for uniform penetration of heat and were then held at this temperature for varying periods of time. It was found that single bandages artificially contaminated with spores of *Clostridium sporogenes* and of *Bacillus subtilis* required four hours' treatment for sterilization. They appeared to be in good condition and were submitted for clinical trial.

Six of these bandages were used to apply a walking cast to a patient suffering from a left Pott's fracture. The cast appeared to harden normally within the normal time and the patient left the hospital wearing what appeared

to be a satisfactory cast. However, he returned four days later with a cast which had weakened and begun to crumble.

This experience wherein a fault in the heat-treated plaster occurred which was not detectable on initial inspection, and which did not become apparent until some days after the cast had been applied, presented an unexpected and difficult problem. Needless to say it left the surgical staff with a feeling of suspicion towards the assured and constant reliability of any heat-sterilized product.

At this time when it appeared that, rather than further empirical experiment, investigation of the basic physiochemical factors involved in the satisfactory hardening of the gypsum might be indicated, we were fortunately presented with an alternative approach. One of us (R.J.G.) learned, through personal communication, of the formalin vapour method employed by Taylor and Moloney for sterilization of plastic syringes. With their kind permission it was decided to attempt to apply this method to the sterilization of plaster bandages. Their technique, which is described in detail in their report,[4] was closely followed.

TREATMENT WITH FORMALIN VAPOUR IN VACUO

Stock plaster of Paris bandages containing a wide variety of natural contaminants were unrolled and, in addition, heavily seeded throughout with spore suspensions of *Cl. sporogenes* and of *B. subtilis*. They were tightly re-rolled and treated with formalin vapour *in vacuo* according to the method of Taylor and Moloney.[4] Each bandage was then aseptically transferred to a sterile fruit sealer containing approximately 300 c.c. of Bacto fluid thioglycollate medium and incubated for one week at 36° C. None of 31 bandages treated in eight separate experiments showed growth, while from control unheated bandages tested at the same time *Cl. sporogenes* and *B. subtilis* grew in from 24 to 48 hours. However, as a further check on the test medium, 24 of the bottles, sterile after completion of the seven-day sterility test, were inoculated with subtilis and sporogenes spores. Only two showed growth. Tests showed that residual formalin from the bandages had diffused into the medium and also that over the seven-day period there occurs a gradual fall in pH of the medium. It was found that this bacteriostatic change in the medium did not appear until after the bandage had been in contact with the medium for a few days. It could be entirely circumvented by simply increasing the volume of the medium to not less than 750 c.c., or the smaller volume of medium could be used if the bandage, after formalin treatment, were similarly treated *in vacuo* with ammonia vapour to "inactivate" the formalin and the medium buffered with marble chips.

To assure that the sterility test, as applied, would detect even small numbers of spores five bandages were sterilized by formalin vapour in one lot. One was directly tested and proved to be sterile. Using precautions to avoid surface contamination three of the remaining bandages were inoculated in the centre of the roll with 1 c.c. of a diluted suspension of *B. subtilis* spores containing 13 spores per c.c. as estimated by plate count. The other bandage was similarly contaminated with 10 spores of *Cl. sporogenes*. From each of the bandages, spores seeded in this minimum concentration produced growth in the medium within 48 to 72 hours.

Ten individual bandages artificially contaminated with *Cl. sporogenes* and *B. subtilis* spores were treated with formalin vapour in four experiments and their sterility tested in the larger volume of medium. All were sterile and the media seeded at the end of the test period grew *B. subtilis* and *Cl. sporogenes*. Fifty-six bandages tightly packed in containers of six to twelve bandages were similarly treated in six separate tests. Samples removed from each container were sterile and the media at the end of the test period supported growth from spores of *Cl. sporogenes* and *B. subtilis*.

CLINICAL TRIALS OF FORMALIN TREATED BANDAGES

Using formalin-treated plaster bandages, aliquot samples of which had been tested and proved sterile, one of us (J.B.E.) has applied 50 plaster casts of which 19 were for compound fractures. Many types of casts were made including those for the spine, upper and lower limbs, walking casts, etc. The injuries varied from simple fracture of the phalanx to a crush fracture of the spine and pelvis. In every instance the bandages felt and looked quite similar to unsterilized bandages. There was no difficulty in applying them; they set normally and stood up to all the usual wear and tear expected of any plaster cast.

During the investigation an unexpected opportunity arose to test the product most rigidly. One of us (R.J.G.) had the misfortune to suffer a Pott's fracture. Our colleague (J.B.E.) reduced the fracture and applied a plaster cast. After the acute phase of œdema and swelling had subsided, this cast, which was in every respect normal, was removed and a walking cast applied. The latter was purposely constructed as lightly as possible, four rolls of 4″ bandage making up the whole cast. For the following six weeks this walking cast was submitted to, if anything, more than the normal wear and tear and was still in good condition when removed.

No odour of formalin has been noticed at any time by those using the bandages. Although, in several instances, unpadded portions of plaster have been in direct contact with the skin no incidence of skin irritation has occurred.

DISCUSSION

The reports by Murray and Denton and by Greenberg leave no doubt as to the potential hazards involved in applying unsterilized plaster of Paris bandages over a compound fracture or a surgical wound.

While we do not infer that further study might not evolve an efficient process for dry heat sterilization of plaster bandages, in our limited trials we were unable to obtain a satisfactory product by this method and we have been aware through indirect communication that others have similarly encountered considerable difficulty. On the other hand, our experiments have shown that by formalin treatment *in vacuo* a sterile product of unimpaired quality can be produced.

We believe that this method, if desired, could be expanded to commercial scale. For the small hospital laboratory, simple, readily available equipment may be used. Although in our original experiments we employed a very high vacuum provided by a "hyvac" pump we have since found that a good filter pump may be substituted if close attention is paid to the airtightness of all connections. A clamp type of pressure cooker may be adapted as a vacuum chamber by inserting a metal stopcock through the opening left by removing the safety blow-off device and reinforcing the closure by using a thin rubber gasket and lubriseal between the lid and body flanges (with some models in which the surfaces are exceptionally well ground lubriseal alone is sufficient).

Since, ordinarily, only a portion of the plaster bandages used in a hospital need be sterile, the sterilizing process has in practice added no great burden to our laboratory. Bandages treated in an original metal container which, following sterilization, is immediately sealed with waterproof adhesive or Scotch tape and stored in a dry place should remain sterile almost indefinitely. Routine good practice would of course dictate that aliquot samples from each lot processed should be tested for sterility before the lot is released for use.

SUMMARY

1. In our limited experiments we were unable to produce plaster of Paris bandages of uniform good quality when sterilized by dry heat.

2. Stock plaster of Paris bandages containing a variety of natural contaminants and further artificially contaminated by the addition of spore suspensions of *Cl. sporogenes* and *B. subtilis* suspensions have been consistently rendered sterile after treatment by formalin vapour *in vacuo*.

3. Formalin-treated bandages used to prepare casts for fifty fracture cases involving a wide variety of types of casts have proved uniformly satisfactory.

4. In our hospital two rules have been adopted. Firstly, that in all cases of open wounds, surgical wounds or compound fractures where immobilization in plaster is contemplated, only sterile plaster bandages may be used. Secondly, under no circumstances shall other than sterile plaster bandages be brought into an operating theatre.

We would like to express our thanks to Messrs. Smith & Nephew, Ltd., of Montreal, for supplies of their gypsona plaster of Paris bandages.

REFERENCES

1. MURRAY, E. G. D. AND DENTON, G. D.: *Canad. M. A. J.*, **60**: 1, 1949.
2. GREENBERG, L.: *Ibid.*, **60**: 4, 1949.
3. KLOTZ, M. O.: *Ibid.*, **60**: 6, 1949.
4. TAYLOR, E. M. AND MOLONEY, P. J.: *Ibid.*, This issue.

STERILIZATION OF PLASTIC SYRINGES BY FORMALIN VAPOUR

E. M. Taylor, Ph.D. and P. J. Moloney, Ph.D.

From the Connaught Medical Research Laboratories, University of Toronto, Toronto, Ont.

THE method of sterilization described here was developed because of a problem which was presented in the sterilization of disposable plastic syringes (Becton and Dickinson). It was found that such syringes could not be sterilized in a steam pressure autoclave, since during sterilization the syringes tended to melt and were thus rendered useless. The method is in principle the same as that described by Salle and Korzenovsky,[1] namely the material to be sterilized is subjected *in vacuo* to formaldehyde vapour. In the method as we have applied it formaldehyde vapour is produced as described below and not by dropping formalin on potassium permanganate; and the apparatus is essentially all glass. This latter condition is of some interest. In certain experimental trials the chamber in which sterilization was carried out, was made in part of brass. It was found that plastic syringes treated with formaldehyde in such a chamber at a temperature of 37 to 40° C. became warped just as plastic syringes warp in a steam pressure autoclave. It is probable that the warping of the syringes was due to the presence of methyl alcohol derived from formaldehyde by the catalytic effect of brass.

In order that sterilization be accomplished by the formaldehyde-vacuum method it is essential that formaldehyde reach all contaminated surfaces, hence the necessity for first attaining a high vacuum throughout the system. It follows also that sterilization will not be effected in contaminated gas-tight pockets.

The apparatus used is shown diagrammatically in Fig. 1. For clamping off rubber tubing, screw-type clamps are used. Since the apparatus is subjected to a high vacuum, the operator should be protected against the possibility of an accident due to shattering glass by wearing suitable goggles. The following are details of the method of operation.

Preparation of syringes.—In order to ensure that the lumen of the syringe needle is not plugged, run a wire through its entire length and then withdraw it. Stopper the open end of the syringe with a rubber thumb rest which is part of the assembly, and assemble the syringe

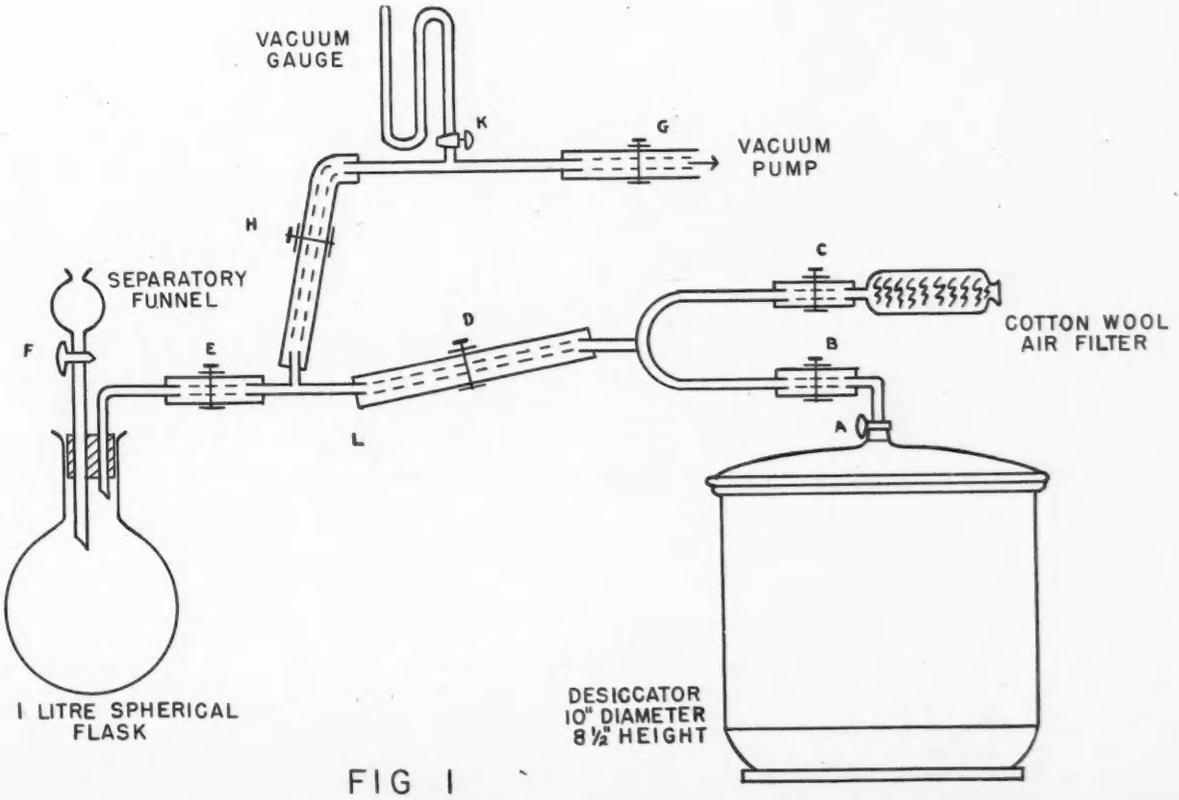


FIG 1

and needle guard in a test tube as shown in Fig. 2. It is essential that the needle guard be separated from the syringe during the sterilization.

Assembly and operation of the apparatus.—Assemble and autoclave the air filter with connections shown in Fig. 3. At each rubber and glass joint rubber cement should be applied to the glass surface before the tubing is fitted on. Pressure tubing which will not collapse *in vacuo* must be used.

Clean carefully with cloth all the ground glass surfaces of the desiccator and apply lubriseal. Turn and force in the stopcock and stopper and move the lid in a back and forth motion in order to distribute the grease evenly.

Place, horizontally, in the desiccator the tubes containing the syringes to be sterilized as shown in Fig. 2. Along with these, for each run, place three test-tubes as in Fig. 4, stoppered with cotton wool and containing each a capillary pipette contaminated with a 24-hour broth culture of *E. coli*. Place the desiccator in a wooden protecting box.

Connect the sterilized cotton wool air filter assembly as shown in Fig. 1 to the stopcock outlet of the desiccator after having first applied rubber cement to the glass. Clamp off the rubber tubing at C. Connect the rest of the apparatus as shown in Fig. 1.

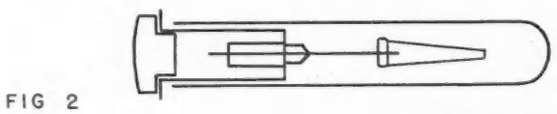


FIG 2

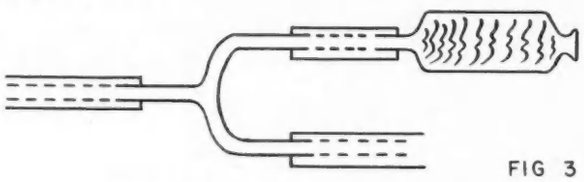


FIG 3

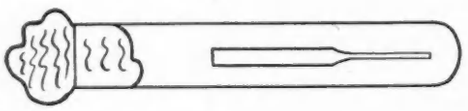


FIG 4

Measure 35 ml. of formalin into the bulb of the separatory funnel (Fig. 1). Carefully open stopcock F in order to fill the hole of the stopcock with formalin and close at once. The formalin which should contain 35 to 40% formaldehyde should be checked by chemical analysis.

With stopcocks F and K and clamp C closed and all other clamps and stopcocks open, start the vacuum pump and pump until a vacuum of less than 1 mm. is attained. This observation is made by opening stopcock K from time to time during the pumping.

Clamp off the tubing at H. Lower the spherical flask into a pan of water which has been brought to the boil and open stopcock F and allow all but 1 or 2 ml. of formalin to run into the flask. Let the formaldehyde distil over for 5 minutes. Finally close stopcock A, clamp off D and then B. Remove clamp E and open stopcock F and disconnect the glass and rubber at point L. Place the desiccator in an incubator at 37° C. and leave in the incubator for 18 to 20 hours.

Remove the desiccator from the incubator and test the pressure as follows: Connect the rubber and glass tube at L, clamp off at E and with clamps H and G open start the vacuum pump and pump to a vacuum of less than 1 mm., then open clamp D and B, and continue pumping until the vacuum is again less than 1 mm. Close clamp G, open stopcock A and read the pressure, which should be no greater than 50 mm. A greater reading than this figure indicates that too much air has leaked into the desiccator and that the entire process of formaldehyde distillation should be repeated. Certain desiccators were found to be unsuitable as they were too coarsely ground to maintain a sufficient vacuum.

Close clamp D, and open clamp C, after first having placed a piece of filter paper over the open end of the air filter in order to admit sterile air slowly to the desiccator. Close clamp C and with clamp E and stopcock K closed and clamps B, D, H, and G, and stopcock A open, evacuate the system. Again close clamp D and with a piece of filter paper over the open end of the air filter, open clamp C. Repeat this whole operation of evacuation and letting in air a total of three times, in order to remove excess formaldehyde.

Remove the lid from the desiccator, take out the test tubes containing the contaminated pipettes, transfer these latter, aseptically, using forceps, to suitable broth, and as a control also transfer to suitable broth contaminated pipettes which have not been treated with formaldehyde.

Incubate the tubes of broth containing the glass pipettes at 37° C. for 8 days. There must be no growth in any of the tubes containing the glass pipettes which had been subjected to treatment with formaldehyde, whereas all the tubes containing control pipettes must show growth.

If the sterility test is satisfactory the syringes are ready for use. As soon as a syringe is removed from a desiccator its needle guard must be aseptically fixed in position. This may be simply done by bringing the test tube containing the syringe and guard to a vertical position so that the syringe with the guard loosely in position slides into the hand. The guard may then be held by the finger and fixed firmly in place.

Using the method of sterilization described above we were able to sterilize capillary pipettes which had been contaminated with suspensions of spores of *Cl. novyi* and of *Cl. tetani*.

CONCLUSIONS

A detailed description is given of a method of sterilization which depends on the action of formaldehyde *in vacuo*. The method is suitable for the sterilization of certain materials which cannot be sterilized in a steam pressure autoclave.

REFERENCE

1. SALLE, A. J. AND KORZENOVSKY, M.: *Proc. Exper. Biol. & Med.*, **50**: 12, 1942.

"The *exact* locality of the greatest sensitiveness to pressure has seemed to me to be usually one of importance. Whatever may be the position of the healthy appendix as found in the dead-house—and I am well aware that its position when uninflamed varies greatly—I have found in all of my operations that it lay, either thickened, shortened, or adherent, very close to its point of attachment to the cæcum. This, of course, must in early stages of the disease, determine the seat of greatest pain *on pressure*. And I believe that in every case the seat of *greatest pain, determined by the pressure of one finger*, has been very exactly between an inch and a half and two inches from the anterior spinous process of the ilium on a straight line drawn from that process to the umbilicus. This may appear to be an affectation of accuracy, but, so far as my experience goes, the observation is correct."—Original description of McBurney's point.

CASE REPORTS

THE STURGE-WEBER SYNDROME*

G. B. Wiswell, M.D., C. S. Marshall, M.D. and D. C. Metcalfe, M.D.

Halifax, N.S.

The Sturge-Weber syndrome consists of the combination of a facial vascular nevus, intracerebral calcification, convulsions, ocular abnormalities, and mental retardation.

The first mention of the association of facial and intracranial hæmangiomas was made by Horrocks[1] in 1883, following which several other isolated cases were reported. It was Weber,[2] however, in 1922, who first published an account of a case which showed a facial angioma in conjunction with x-ray evidence of intracranial calcification. Krabbe[3] showed that this calcification occurred within the second and third layers of the cerebral cortex. The first reports of this syndrome in American literature were made by Cushing[4] in 1906. Up to the present time nearly 200 cases have been recorded.

G.C., a three-and-a-half year old white female child was admitted to hospital on March 9, 1949, with the history of repeated convulsions. Birth had apparently been normal. A large left-sided facial hæmangioma had been noted at the time of delivery. Developmentally, the child appeared retarded, sitting up at one year of age, walking at 25 months, and beginning to talk for the first time at 38 months. Teeth had erupted in normal sequences at the usual ages. Feeding history disclosed no abnormalities.

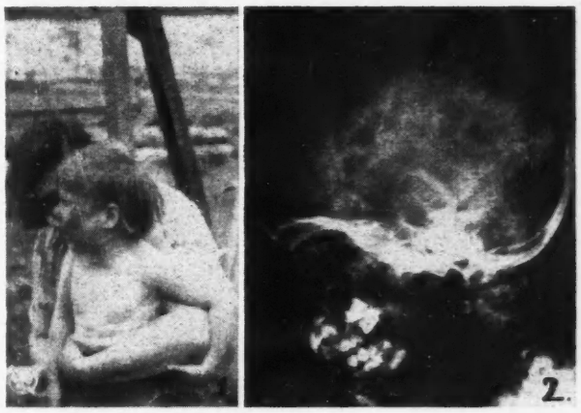
At the age of two months a convulsion occurred for the first time, generalized in nature, lasting for a period of five minutes, and followed by a post-ictal period of somnolence of one hour's duration. Convulsions occurred daily thereafter, reaching a maximum frequency of five per day, until the infant attained the age of nine months, when they suddenly ceased. No further convulsive episodes were noted until January, 1949, when a recurrence took place, the child having generalized clonic convulsions several times daily throughout January and February. In the early part of March the attacks diminished in frequency to two or three weekly, this state persisting until admission to hospital. No further details regarding the characteristics of individual convulsions could be obtained from the parents.

On inquiry, the mother stated that the child had had a slight limp in the right leg since she had started to walk, and that the right arm had always appeared weaker and smaller than the left arm. Functional inquiry was otherwise negative. Family history was noncontributory. No history was obtained of other members of the family having had large birth marks.

On admission, temperature was 99.8°, pulse 120, respirations 24. Examination revealed a white female child of approximately stated age, rather pale, but well-developed and well-nourished. The head was normal in size and shape. A purplish, smooth, flat nevus was present on the left side of the face, extending from the ala of the nose to the ear horizontally, and from the corner of the mouth to the vertex of the scalp in the sagittal direction (see Fig. 1). Several carious teeth were present. Tonsils were moderately enlarged and the anterior pillars injected. Ears, neck, thorax, heart and lungs were normal, as were the back, abdomen and genitourinary system. The right extremities were slightly smaller than the left in all diameters measured; no differences in limb lengths were demonstrable. Active movements were present at all joints of all four extremities. Neurological examination, including tendon reflexes, was essentially negative. Fundoscopic examination showed the optic discs to be sharply outlined without any evidence of pathology of the retinal vessels. No other cutaneous hæmangiomas were seen.

Urinalysis was negative. Hæmoglobin was 12.8 grams (80%), leucocyte count 9,250 with a normal differential blood picture. The tuberculin test was negative as was the blood Wassermann. Blood chemistry values were within normal limits. The cerebrospinal fluid was under normal pressure and was clear; protein, sugar and chlorides were normal. Stereoscopic skull x-rays showed scattered calcification involving the left hemisphere which appeared to be just beneath the inner table of the skull (see Fig. 2).

Course in hospital.—The day following hospital admission a generalized clonic convulsion occurred, lasting three minutes, and followed by a somnolent period of two hours' duration. Two days later a second convulsive attack occurred, this time consisting of clonic movements of the right arm and leg, and lasting five minutes. No further seizures took place during the patient's stay in hospital. Neurological and neurosurgical consultants concurred in the opinion that further investigative procedures were unnecessary and unwarranted and that surgical intervention was contraindicated.



2.

DISCUSSION

A case of the Sturge-Weber syndrome, in a three-and-a-half year old female child is reported. This patient showed four of the five criteria of the syndrome, ocular manifestations being absent, as in the case recently described by Downing and Kreidberg.[5] The x-ray picture is typical of that found in the syndrome and is almost identical with that described by Camp.[6]

REFERENCES

1. HORROCKS, P.: *Tr. Ophth. Soc. U. Kingdom*, 3: 106, 1883.
2. WEBER, F. P.: *Proc. Roy. Soc. Med.*, 22: 430, 1929.
3. KRABBE, K.: *Arch. Neurol. & Psychiat.*, 32: 137, 1934.
4. CUSHING, H.: *J. Am. M. Ass.*, 47: 178, 1906.
5. DOWNING, D. F. AND KREIDBERG, M. B.: *J. Pædiat.*, 34: 564, 1949.
6. CAMP, J. D.: *J. Am. M. Ass.*, 137: 1023, 1948.

* From the wards of The Children's Hospital, Department of Pædiatrics, Dalhousie University.

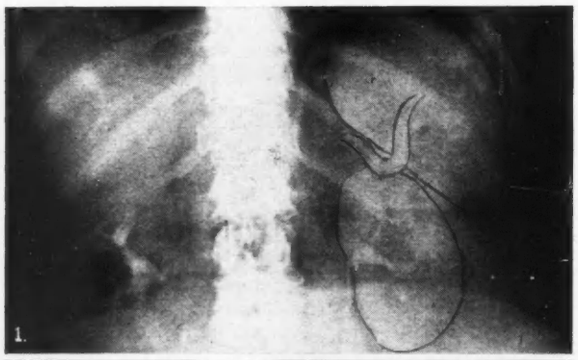
A CASE OF SPLENIC ARTERY THROMBOSIS

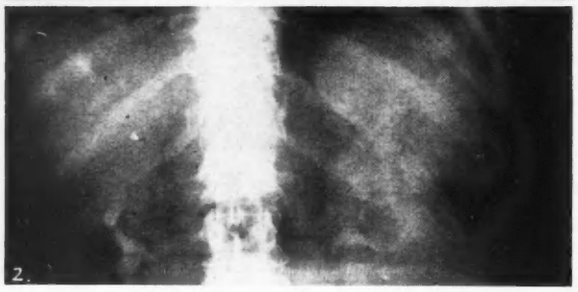
J. A. M. Cameron, M.D., F.R.C.S.[Edin.& C.]

Calgary, Alta.

It was with some satisfaction that skiagraphy confirmed the clinical findings in this case, since at first it was thought to be one of left renal colic.

Mrs. M.W., aged 70. The patient was a multipara, having been fit until two years ago. Since then she has known about her mild glycosuria but has failed to keep to her diet, and has not been receiving insulin for many





months, since many of the urine specimens are sugar-free. About one month before admission the family doctor found six consecutive specimens to be free of sugar.

She was seen at home on June 18, complaining of severe pain in the left flank, radiating to the loin and downwards to the left iliac fossa. This pain had come on quite suddenly, at 4 a.m. on the 14th. At first it was colicky, and radiated from left loin round to the left upper quadrant, but not to the lower abdomen. She had vomited frequently with some relief, and there was no dysuria. Bowels were regular. She passed urine every few hours for the first two nights, but had been wakeful. There was no complaint of cough, excess flatus, distension, nor of altered stool.

The patient showed signs of obesity and hypothyroidism, with a receding clear-cut hairline, malar flush, and a torpid appearance. The temperature was 98° F., and the pulse 86 and regular. The peripheral arteries felt harder than usual, blood pressure being 180/100. There was a metallic apical systolic murmur, the apex beat being indeterminate in position. Pupils were equal and active, the knee reflexes absent. The abdomen was rotund but lax. For three days after admission the tip of the spleen could be felt and it was at first tender. There was not any friction rub although this was repeatedly looked for. At this time the left loin was acutely tender to light pressure. Per rectum nothing abnormal was felt. The urine showed a brown deposit with Benedict's test. A fresh specimen showed no abnormal cells or crystals after centrifuging. A plain skiagram of chest and abdomen showed a heart of normal size, clear lungs, and no renal calculi. Advanced atheroma was seen in various arterial shadows.

The intravenous pyelogram proved most instructive, since it was normal. However it did serve to delineate the various structures.

The fever settled gradually from 100° F. to normal in the next week. Blood sugar 400 mgm. % at three hours after a sugar tolerance test was done, and still rising values on the plotted curve which was obtained. Sedimentation rate 23 mm./hr., white blood cells 20,100. Kahn negative.

Upon a diet of 1,000 calories the urine rapidly became sugar-free, and the patient went her way rejoicing.

Diagnosis.—Diabetes mellitus with atheromatous arteries and thrombosis of the very sclerosed splenic artery. An incidental finding was diverticulosis upon examination of the colon with a barium enema.

I am indebted to Drs. Symington and Bell for the x-ray work and to Miss James of the Department of Veterans' Affairs for the reproduction of films.

More and more we are beginning to realize that "preventive medicine" is not a specialty but an attitude. Preventive medicine must be practised by all of us regardless of our categorical listing in medical directories. The ophthalmologist who treats the patient with conjunctivitis and fails to take cognizance of the symptoms referable to other portions of the patient's anatomy, whether in his opinion these symptoms stem from a psycho, a somatic, or a psychosomatic condition, thereby becomes guilty of the criticism which is being hurled at the medical profession today from every quarter.—Brig. Gen. George E. Armstrong, *The Diplomate*, **20**: 278, 1948.

THE CANADIAN MEDICAL ASSOCIATION

Editorial Offices—3640 University Street, Montreal

(Information regarding contributions and advertising will be found on the second page following the reading material.)

EDITORIAL

The Adrenal Gland and the Rheumatic State

SINCE P. S. Hench[1] and his co-workers at the Mayo Clinic first announced their results of the treatment of 14 patients with rheumatoid arthritis with large daily, 100 mgm., doses of cortisone of Kendall (17-hydroxy-dehydrocorticosterone), developments have occurred rapidly in this new form of therapy. Subsequently[2] cortisone was found to have a dramatic effect in patients with acute rheumatic fever. Then it was found that results similar to cortisone administration could be obtained by treatment with adrenocorticotropic hormone, ACTH, thereby stimulating the patient's own adrenal cortex to liberate increased amounts of 11,17 oxysteroids. Recently a review article has appeared by Thorn[3] and his co-workers in Boston, summarizing the developments in 11,17 oxysteroid therapy, and describing their results in the treatment of 10 patients with rheumatoid arthritis, 3 with rheumatoid fever, 3 with disseminated lupus erythematosis, and in 1 patient with gout. Rheumatic fever, disseminated lupus erthyematosis, and rheumatoid arthritis may be viewed as related mesenchymal diseases,[7] characterized by a non-specific inflammatory reaction, presumably brought on by a peculiar susceptibility of the host to certain bacterial or tissue products. Such pathological states are apparently favourably altered by a sudden increase in the titre of circulating 11,17 oxysteroids or related compounds of adrenal origin. With a sudden increase in the level of these steroids, the progress of the inflammatory reaction in heart, vessels, and synovia is temporarily arrested. The majority of patients with these diseases seem to possess normal adrenal cortical reserve function, but appear incapable of increasing the activity of their adrenal cortex spontaneously. Elsewhere in this *Journal*, Dr. Selye has reported on the action of ACTH in the anaphylactoid state, and soon reports will appear in the literature further extending the scope of 11,17 hydroxysteroid therapy.

The singular specificity of adrenal steroids in their action on rheumatic diseases is suggested by the prompt response to cortisone and the ineffectiveness of desoxycorticosterone and dehydrocorticosterone acetate. The present supply of cortisone and pituitary ACTH is limited. Cortisone was first isolated from the adrenal cortex in 1935 by Dr. E. C. Kendall and co-workers as a crystalline steroid and its chemical formula was determined by them in 1938. In 1946, it was synthesized in a 24-hour step procedure from a bile acid, desoxycholic acid, by Sarett in the Merck research laboratories in the form of an acetate, when it became known as cortisone acetate (Merck). It is limited in amount and expensive.[5]

ACTH is at present derived from the pituitary body of domestic animals, the hog in particular. Some 4,000 hogs will yield enough ACTH to treat one patient for 20 days. ACTH and cortisone acetate are at present available to competent investigators who have at their disposal adequate facilities for properly studying the overall metabolic effects, mode of action, and clinical influence of these hormones in various disease states.

Further development of therapy with cortisone and ACTH will depend upon the quantities of these substances which become available, and their cost. One recalls the early days of penicillin and streptomycin when supplies were limited and the cost prohibitive. Of particular interest, therefore is the recent announcement of a vegetable source of raw material for the preparation of cortisone. The seeds of the tropical vine, *Strophanthus sarmentosus*, which grows in East Africa and other equatorial regions, contain a glucoside which on hydrolysis yields sarmentogenin; this substance can be converted into cortisone by a somewhat shorter chain of reactions than is required when starting from desoxycholic acid. Unfortunately the vine does not bear seeds for five years after cultivation, but if propagation and culture can be satisfactorily carried out this source may provide large supplies of the drug in the future. An important factor is the amount of medical supervision and laboratory control which will be necessary during treatment. Early reports indicate that overtreatment with ACTH or cortisone may precipitate the symptomatology of the Cushing syndrome.[6] Further investigation is needed to determine

the effects of interfering with the normal pituitary-adrenal cortex relationships. During the administration of cortisone the adrenal gland presumably undergoes compensatory atrophy, whereas with ACTH, there will be marked hypertrophy and hyperplasia of the adrenal cortex, and with both drugs the function of the anterior pituitary body, at least in production of ACTH, will be depressed. Studies on the state of adrenocortical function in patients who subsequently responded to treatment do not permit one to postulate adrenocortical insufficiency as a prerequisite to the development of the rheumatic state. In fact, rheumatoid arthritis is rarely seen among untreated patients with Addison's disease.

The beneficial effect of 11,17 oxysteroid therapy constitutes a great advance, but while therapeutic advances are important, equally or more important is that these recent advances may lead to a better understanding of pathogenesis of rheumatoid arthritis and related disorders. J.H.D.

REFERENCES

1. HENCH, P. S., KENDALL, E. C., SLOCUMB, C. H. AND POLLEY, H. F.: *Proc. Staff Meet. Mayo Clin.*, **24**: 181, 1949.
2. HENCH, P. S. *et al.*: *Proc. Staff Meet. Mayo Clin.*, **24**: 277, 1949.
3. THORN, G. W. *et al.*: *New England M. J.*, **24**: 529, 1949.
4. Editorial: *J. Am. M. Ass.*, **140**: 1158, 1949.
5. BOLAND, E. W. *et al.*: *J. Am. M. Ass.*, **141**: 301, 1949.
6. HILLS, G. *et al.*: *Blood*, **7**: 755, 1948.
7. BAEHR, G. AND POLLACK, D.: *J. Am. M. Ass.*, **134**: 1169, 1947.

EDITORIAL COMMENT

Trends in Tuberculosis

There has been a steady decline in the annual death rate from tuberculosis of at least 200 per 100,000 in 1900 to 37.1 per 100,000 in 1948, the lowest in history for Canada, so that tuberculosis has dropped to the eighth cause of death for all ages in 1948. One of the most influential factors in this decline has been improved facilities for the treatment of tuberculosis. In 1900, 60 beds were available at Muskoka, Ontario, for the treatment of tuberculosis. The 1949 figure for beds occupied or to be completed this year is 16,000, which is between 3 and 4 beds per death, as there were 4,771 deaths from tuberculosis in Canada in 1948.

Our therapeutic armamentarium is being increased, witness some of the articles appearing in the present number of this *Journal*. The patients in our sanatoria are receiving more adequate care, including occupational therapy and physiotherapy; the social service follow-up of patients, and the identification and investigation of contacts are becoming more thorough. Every year more industrial concerns are including chest x-ray surveys as part of their medical service, and more hospitals are doing routine chest films on all new patients. In 1948, two million people in Canada were examined for tuberculosis. It is the impression of doctors working in tuberculosis clinics throughout the country that fewer far-advanced cases are being discovered each year, so that we are nearing the ideal goal of discovering the disease in its early stages.

However, much work remains to be done. Tuberculosis is still the leading cause of death for the age group 15 to 45 years. In 1948, in Canada, there were 951 deaths below 20 years of age, and 1,742 between 20 and 40 years, so that tuberculosis is still a crippling disease of our younger population during their productive years. Although we now have between 3 and 4 beds per death, probably 10 beds per death are required for institutional segregation for every patient in Canada with active tuberculosis, and any patient who is expectorating tubercle bacilli is a potential hazard to his community, and under ideal conditions should certainly be segregated so that danger of his spreading the disease may be averted.

The legislation regarding patients with positive sputum varies considerably in the different provinces. In nearly all provinces under the Health Act (in respect to communicable diseases), the Health Officer has the power to hospitalize anyone suffering from a communicable disease, but as this regulation has no provision to restrain a patient, it is of limited value. Several of the provinces have specific legislation giving the Health Officer authority to lay a charge to have a patient with positive sputum apprehended and restrained in an institution. This includes Ontario, Manitoba, Alberta, and British Columbia, but the weakness is that the sanatoria usually refuse to become custodial institutions to lock people under guard, so that in essence, any patient with a positive sputum is at liberty to leave a sanatorium against medical advice and return to his home. This is a difficult problem, but it is generally agreed that the provinces should first provide enough treatment beds and make the standard of treatment good, attractive and free, before compulsion is applied. In most provinces with good services, the number of patients with positive sputum who refuse treatment is comparatively few.

Many tuberculous patients do not receive adequate care as regards occupational therapy and physiotherapy, because insufficient funds are available to attract and hold adequately trained personnel, and such personnel find that the hazard of working with tuberculous patients is too great. That is, if they contract the disease while working, no compensation is available in most provinces. So far, the only

province which has made tuberculosis nursing compensable is British Columbia.

In short, whilst we have made considerable progress, much work remains to be done before "the white plague" is no longer with us.

J.H.D.

BIBLIOGRAPHY

1. Canadian Tuberculosis Association, 48th Annual Report, 1948.
2. WHERRETT, G. J.: Personal communication.

MEN and BOOKS

A PUBLIC HEALTH LECTURE, 400 YEARS AGO

H. L. Stewart, M.A., Ph.D., F.R.S.C.

Halifax, N.S.

An institution familiar to our age is the "Public Health Lecture", by a representative physician, explaining to the public what ought to be generally known about recent medical progress. But the advertisement of such an address by the city physician of Basel, in June, 1527, is surely unique. It was the day before the Feast of St. John, and the opportunity of a large audience was too attractive to lose. So a proclamation in the following terms appeared on the door of the City Hall:

> "The famous Doctor Paracelsus, City Physician, will speak at High Noon tomorrow in the Town Square upon the New and Marvellous Light of Medicine. He will also touch upon the Ignorance, the Avarice, and the Strutting Vanity of the Doctors of Basel."

The performance proved no less sensational than the announcement. Works of the then standard authorities, Galen and Avicenna, were publicly burned, while the orator described his professional brethren as fattening on the public simplicity, inventing diseases to secure a fee for their pretended cure, applying to real diseases remedies which only made the patient worse, and disguising their ignorance while they promoted the imposture by the use of Greek or Latin technical terms which meant nothing either to themselves or to anyone else.

The available evidence about medical practice at the time makes one hesitate to say that Paracelsus was here exaggerating. Mr. Herbert Vaughan has compared the doctors of Medicean Florence to present-day practitioners of witchcraft in tropical Africa. Will anyone call this unfair to the experts at the bedside of Lorenzo the Magnificent, who administered to him a potion in which they had dissolved pearls and gems of the highest value? They did so apparently in good faith, despite the tempting suggestiveness which the modern reader finds in such satire on their patient's habitual way of measuring values. The spirit of the Renaissance was abroad; but although only good could result from revival of the free enquiring spirit of antiquity, slavish devotion to ancient doctrines was a chief source of error. Many a docile Galenist of the fifteenth century reminds one of the temper of Plutarch, who had learned with some surprise from reading Plato that food descends not into the stomach but into the lungs, and yet avows his unwillingness to dispute so authoritative a judgment!

Against authoritative judgments, however, without much consideration whether they were right or wrong, but in fierce resentment of their pretence to authority, the heretic was here and there very active in sixteenth-century schools. The protest of Paracelsus against Galen and Avicenna was curiously combined with his own conviction that medical practice should be directed by study of the stars! His search everywhere for knowledge by actual experiment was encumbered with his quaint hypothesis (the so-called "signatures") about each process in the human body reflecting some process of the cosmic system. Thus one often doubts whether the value of his spirit of rebellion or the folly of his own substitute doctrines should prevail in a balanced estimate of his career. At least, however, he was an observer of tireless patience: he studied the properties of metals and plants by trial, with contemptuous disregard of tradition regarding them; and the immense fame he attained for success in treatment, far beyond that of his medical colleagues, can not be explained away as due wholly to imposture.

Herein Paracelsus supplied an example of wholesome criticism which led others much further and better than it led himself. The work of the great anatomists, among whom the special fame of Vesalius should not make the historian of science forget others, was quickly followed by no less striking physiological advance. William Harvey completed it in 1628, with discovery of the circulation of the blood; but at least three-quarters of a century earlier, Michael Servetus had ventured substantially the same hypothesis, on the same ground of observed facts indicating a theory about the movements of the heart, clear as day except to those with an ancient dogma to blind them. A way of thinking and of writing which, in another sort of controversy, was destined to bring tragic consequence on Servetus!

* * *

James Anthony Froude once pressed upon the attention of theologians the example of progress in medicine. What, he asked, would have been the fate of patients if the doctors had been bound for all time to "Thirty-Nine Articles of Physic", so that they must show every innovation they ventured in treatment to be reconcilable with doctrine set by a Congress of their professional predecessors in the sixteenth century? Modernism in medicine is

not so timid. Doctors are not driven to the evasive ingenuity by which ancient Creeds are "cracked and strained". The comparison, like most fertile comparisons, has its limits of aptitude, and the theologians are not quite so destitute of an effective answer as this critic suggested. A good deal in the shrill Modernism that is now so popular may be convicted of follies as bad as those of Paracelsus. But his "Public Health Lecture" in medicine of four hundred years ago provides hints for thought, both negatively and positively, in a very different period of the world.

THE CENTENARY OF PAVLOV (1849-1936)

H. E. MacDermot

Montreal, Que.

It is by more than ordinary good fortune that we should be able to mark the centenary of the birth of Pavlov with the publication of his life by Professor Boris Babkin.* Under present conditions we could not look for anything like a balanced account of Pavlov from one of his own countrymen in Russia. More than that, we could hardly expect to find anyone else so preeminently fitted in every way to tell us about Pavlov as this his pupil and friend.

In some respects Pavlov would not appear to be difficult of description. Endowed with great mental power, direct, single-minded, he stands as a colossus in physiology. After his early and notable contributions to cardiac innervation, he turned to the digestive tract and laid well and truly the foundations and much of the superstructure of our modern knowledge in that field. And then he devoted the last 34 years of his long life to the study of the central nervous system, finding in this a profound satisfaction of his scientific aspirations. These things and the story of his labours are clear enough. But his personality is not so easily depicted. One can imagine from what we are told of him, that many who knew him even as well as did Professor Babkin, might call him bigoted, impatient, impulsive, intolerably dogmatic, perhaps unfeeling. Various degrees of these qualities in him are brought out by his biographer, but always as superficial aspects of a man so much bigger than his weaknesses that they leave his greatness unspotted, and his attractiveness undiminished. Probably the central quality of his mind was its concentrated devotion to science. Other spiritual interests he had such as his deep love of his native land and a keen interest in art, but he did not dwell on these. Science dominated his mind with increasing intensity. "Only science," he wrote, "Exact science about human nature itself, and the most sincere approach to it by the aid of the omnipotent scientific method, will deliver man from his present gloom, and will purge him of his contemporary shame in the sphere of interhuman relations." He could not listen in later years to music with full enjoyment for, as he said, "My mind keeps switching to conditioned reflexes."

This intense concentration sharpened his irritability over trivial things, and the complete egotism by which he compelled all who lived and worked with him to sacrifice their interests to his. But that egotism asked for nothing for himself. He lived the simplest life. If he could get his beloved cabbage soup, and have a game of gorodki (played by throwing sticks at small wooden blocks) he was perfectly happy. Indeed he would say "I am by nature more of a peasant than a professor". Less than two months before he died he wrote: "All my life I have loved intellectual and physical work, and indeed the second even more than the first. But I have felt particularly satisfied when I have introduced into the latter some successful improvization, that is, have united the head with the hands."

His honours meant nothing to him except perhaps so far as they promoted the cause of science. The announcement that the Nobel Prize had been given him (1904) filled him with surprise. And when his long-suffering wife found it quite natural that his work should be thus appreciated he was greatly displeased, and accused her of forgetting the commandment "Thou shalt not make to thyself any graven image". "Nothing exceptional in my work," he said, "It is all based on facts from which logical conclusions were drawn. That's all." Incidentally, he was advised to invest the prize money in stocks to increase his capital. But he indignantly refused, saying he had earned the money by scientific work and science never had and never could have anything in common with the stock exchange. He therefore deposited the money with a branch of the Nobel firm, and in the 1917 revolution lost it all in the Bolshevik liquidation of securities.

He had the right woman as his wife. Intensely and unchangeably religious herself she never tried to force her religion on him. After he died in 1936 she wrote: "Only my faith supports me. It is not for nothing that Ivan Petrovich used to say: 'I envy no one else, but I envy you your religious faith.' I used to reply to him: 'There is a place prepared for you in God's Kingdom since God judges people not by their words but by their deeds. You live according to Christ's commandments better than any servant of God'. His soul was pure and his aspirations were pure also."

Few men were endowed with greater mental endurance. He worked unceasingly and was in his laboratory till four days before his death, his mind apparently as clear and active as ever.

---

* Pavlov—A Biography. B. P. Babkin, 365 pp. $6.00. University of Chicago Press, Chicago, 1949.

It was his energy which accentuated his impetuous method of speech. The incident is quoted of his shouting down one of his assistants for some mistake which Pavlov himself had committed, until the quarrel led to a complete rupture of relations. But that evening Pavlov wrote him: "Invective is not an obstacle to work. Come tomorrow to do the experiment."

The book is full of stories about Pavlov. No doubt the latter sections dealing with his contributions to physiology are of great historical value. They are written by one with the highest qualifications not only in physiology but in literary expression. But it is the picture of Pavlov himself which is most absorbing. His unique position in relation to the Soviet Government is dealt with firmly and without rancour. No one but Pavlov could have maintained so successfully his status of independent thought and expression.

Professor Babkin considers that he himself has only provided material for a later more comprehensive biography. But who is there that will give us a more revealing estimate of Pavlov: one so truly affectionate in its avoidance of sentimental extravagance, and in its veneration for a a great compatriot?

ASSOCIATION NOTES

Quebec Division of the C.M.A.

It has long been the policy of the Quebec Division Executive of the Canadian Medical Association to encourage scientific meetings in the smaller centres throughout the Province. With the return to peacetime strength of the university groups it has been possible to renew interest in this work and, during the past two years, eighteen speakers have been sent, at the Division's expense, to eight separate peripheral centres. These speakers have presented a wide range of subjects of medical and surgical interest.

In bringing the stimulus of the universities to the practitioners whose geographic positions make it difficult to maintain contact with medicine's most recent advances it is felt that a useful purpose is being served, and it is the intention of the Executive to persist with this work in the coming year.

The expenses of the speakers who, incidentally, have travelled a total of 2,500 miles, have been paid from the rentals obtained at the Annual Convention from the drug and other firms showing commercial exhibits.

The Postgraduate Education Committee of the Quebec Division would welcome requests for speakers to be sent to medical groups throughout the Province.

MEDICAL SOCIETIES

New Brunswick Medical Society

The 69th annual meeting of the New Brunswick Medical Society was held in the Lord Beaverbrook Hotel, Fredericton, August 30, 31 and September 1. Total Registration, 148. The annual meeting has been extended to three days. Dr. G. E. Chalmers of Fredericton, The President of the Society, presided at Business Sessions.

Dr. J. M. Barry in the registrar's report stated that there were now 366 physicians registered in N.B. He also reported that the Medical Council of N.B. were proceeding with great caution in granting enabling certificates to physicians purporting to come from Continental Europe.

One most important change which was approved by the society in business sessions was that in future the secretary of the society be a permanent full time officer, appointed by the executive committee of the Society. To supply the necessary funds to pay the expenses of such an appointed secretary it was agreed to raise the annual fee from $20.00 to $50.00.

The meeting reaffirmed its stand that joint membership in the C.M.A. and N.B. Medical be compulsory. This type of membership was vigorously defended by several members.

The by-laws were amended to include the immediate past president in the Executive Committee. A new schedule of fees was adopted for the guidance of practising physicians.

The annual meeting of the society will be held in Campbellton, in 1950. The election of officers and committees included the following: *President*—Dr. W. W. Fleck; *1st Vice-president*—Dr. E. O. Thomas; *2nd Vice-president*—Dr. R. D. Roach; *Treasurer*—Dr. G. M. White; *Secretary*—Dr. R. A. H. MacKeen; *Executive Committee*—Dr. J. P. Carette; Dr. L. W. Brownrigg; Dr. R. B. Baird; Dr. E. F. Woolverton; Dr. C. C. Gass; Dr. Geo. F. Skinner; Dr. M. Veniot; Dr. A. H. Sormany; Dr. J. L. Giovanetti; Dr. A. W. Clark; Dr. G. E. Chalmers and Dr. D. A. Thompson.

Workmen's Compensation Board Buffer Committee—Dr. J. P. McInerney, chairman; Dr. J. A. Finley, Dr. G. W. A. Keddy.

Cancer Committee—Dr. J. R. Nugent, chairman; Dr. E. A. Petrie, Dr. H. Ripley, plus the president, registrar and secretary.

Canadian Medical Association Council—Dr. A. F. Vanwart, Dr. G. M. White, Dr. J. H. M. Rice, Dr. D. A. Thompson, Dr. G. F. Skinner, Dr. H. E. Britton and Dr. E. Dumont.

Canadian Medical Association Executive Committee—Dr. D. A. Thompson, alternate, Dr. G. F. Skinner.

Canadian Medical Association Nominating Committee—Dr. G. M. White, alternate, Dr. J. H. M. Rice.

Amongst the speakers on the program were Sir Lionel Whitby, London; Dr. F. W. Jackson; Dr. Jack Anderson; Dr. B. P. Colcock, Boston; Dr. R. O. Jones; Dr. L. C. Bingham.

Speakers at the annual dinner were: Dr. G. E. Chalmers, Dr. J. A. C. Anderson, and Dr. T. C. Routley. Their messages were interesting and timely and the more leisurely tempo of the three day meeting allowed adequate time, for the enjoyment of such addresses as well as the splendid program arranged by the Fredericton Committee.

Moncton Medical Society

The Moncton Medical Society at their regular meeting on October 19, heard a program on Industrial Medicine organized by Dr. R. J. Brown, Regional M.O. for the C.N.R. Dr. A. W. Ross discussed "Eye injuries and their treatment". Dr. C. R. Baxter, spoke on skin grafting. Dr. Brown with Dr. R. G. Law, covered general principles of industrial medicine and sanitation in industry. The attendance at these Moncton meetings is rapidly growing and interest is well maintained.

Saint John Medical Society

Dr. R. J. Collins was the special speaker at the September meeting of the Saint John Medical Society. He presented his personal experiences in the use of streptomycin in the treatment of tuberculosis. The address was of special interest due to the relative newness of this drug and the authority of the speaker on all treatment of tuberculosis.

Manitoba Medical Association

The annual meeting of the Manitoba Division of the Canadian Medical Association (Manitoba Medical Association) was held in the Royal Alexandra Hotel, Winnipeg, on September 19, 20, 21, 22 with a large registration. The guest speakers were the President of the Canadian Medical Association, Dr. J. F. C. Anderson of Saskatoon, who spoke at the luncheon on the 20th. Dr. T. A. Watson, Saskatoon, Clinical Director Saskatchewan Cancer Commission; Dr. N. W. Philpott, Montreal; Dr. J. Wallace Graham, Toronto; and Dr. T. C. Routley, who may almost be called a citizen of the world. We are greatly indebted to these gentlemen for their addresses. The scientific exhibits collected by a committee under the chairmanship of Dr. J. M. Lederman were unusually good, and the commercial exhibits were of the usual high standard. In his presidential address Dr. H. S. Evans, Brandon, discussed the Manitoba Health Services Act. A member of the Advisory Committee set up in 1945 under the Act, he spoke with knowledge of his subject. He criticized some features of the health program especially the diagnostic centre which has been in existence for two years or more, and the hospital building program.

The chairman of the membership committee, Dr. C. B. Schoemperlen, reported 84% paid up membership. Dr. D. L. Scott, Winnipeg, was elected President for 1949-50.

ROSS MITCHELL

Winnipeg Medical Society

The first meeting of the 1949-50 session of the Winnipeg Medical Society was held in the Medical College on October 12. Dr. R. E. Beamish and Dr. J. M. Lederman presented a report of a fatal case of coarctation of the aorta showing bicuspid aortic valves and evidence of both old and recent rheumatic infection.

Dr. J. D. Adamson in introducing Sir John Parkinson paid tribute to him as a teacher of the type of Sir James Mackenzie and Sir Thomas Lewis. Sir John then addressed the Society on Difficulties in Cardiac Diagnosis stressing the importance of a carefully taken history. In the discussion that ensued several pupils of Sir John took part. Dr. Lennox Bell in moving a vote of thanks said that with reference to instruments used in cardiology Sir John gave them "the nod but not the knee". So keen was the interest to hear the noted cardiologist and teacher that the room was not large enough and many were turned away.

Thunder Bay Medical Society

The Annual Lakehead Summer School was held under the auspices of the Thunder Bay Medical Society at Port Arthur and Fort William September 8, 9 and 10. Dr. F. G. Kergin, Toronto, held surgical clinics assisted by Dr. F. F. P. Thompson, Dr. B. Stevens and Dr. R. R. Mutrie. Dr. Kergin spoke on Surgical Problems of the Chest and Carcinoma of the Bronchus.

Dr. J. F. McCreary of Toronto held clinics in Pædiatrics assisted by Dr. R. C. Browne, Dr. R. G. Miller and Dr. D. W. Burnford. Dr. McCreary spoke on Recent Advances in Pædiatrics.

Dr. R. C. Dickson, Toronto, held medical clinics assisted by Dr. P. Spence, Dr. T. Montemuro and Dr. A. I. Fryer. He spoke on Complications of Peptic Ulcer and Differential Diagnosis of Chronic Diarrhœa.

Ontario Medical Association District Meetings

District No. 1 held their meeting on November 8 and 9 at St. Thomas. The business meeting was held in the evening and the clinical meeting the following day at the Ontario Hospital in the morning and at the Grand Central Hotel in the afternoon. Dr. J. Clifford Richardson, Toronto, spoke on Diagnosis and Treatment of Epilepsy. Dr. Keith McGregor, St. Thomas, spoke on Indications for Shock Therapy. The hospital staff gave a demonstration of Electro-Shock. In the afternoon Dr. Phillip Thorek of Chicago spoke on The Acute Abdomen. Dr. W. D. Stroud, Philadelphia, spoke on Cardiac Pain, and Dr. Walter Reich, Chicago, spoke on Office Gynæcology.

District No. 2 held their meeting at Guelph on November 1 and 2. Dr. Smith Freeman, Professor of Medicine, Northwestern University, Chicago, gave a medical clinic on Acute and Chronic Renal Insufficiency also a paper on ACTH. Dr. Walter G. Maddock, Associate Professor of Surgery, Northwestern University gave a surgical clinic on Gall-Bladder Diseases and a paper on Principles for the Selection of Parenteral Fluids. Dr. E. K. Lyon was the guest speaker at the luncheon. Professor John A. Weall, Ontario Agricultural College spoke after dinner on The Doctor's Garden.

District No. 3 held their annual meeting at Owen Sound on September 15. Dr. Melville C. Watson, Toronto, spoke on Hormone Therapy in Gynæcological Conditions. Dr. Paul McGoey, Toronto, spoke about Painful Feet. Banquet speakers were Dr. W. V. Johnston, Lucknow and Dr. E. K. Lyon, Leamington.

The District meeting of No. 4 was held in conjunction with the annual clinic day of the Hamilton Academy of Medicine at Hamilton on October 4 and 5. The program topics were: Improved Salvage of Rh Babies by Dr. F. L. Johnson discussed by Dr. R. H. Morgan and Dr. M. Dingwall; Electrolytes in Cardiac Œdema and Postoperative Water Balance by Dr. H. A. Peacock discussed by Dr. C. K. Stuart; Allergic Manifestations in Skin by Dr. Basil Bowman discussed by Dr. R. F. Hughes; Use of Newer Drugs by Dr. P. E. Williams and Dr. R. M. Lymburner; Anticoagulant Therapy by Dr. D. L. Adamson discussed by Dr. L. T. Williamson; Sex Anxiety in Formative Years by Dr. A. C. Church; Sodium Pentothal in Convulsant States by Dr. R. M. Stringer; Colon and Rectum, demonstration of use of Sigmoidoscope by Dr. A. T. Eaton discussed by Dr. F. B. Bowman; Recurrent Varicose Veins and Ulcers by Dr. F. E. Coster discussed by Dr. T. G. Fyshe; Peripheral Vascular Diseases by Dr. F. B. Hamilton discussed by Dr. G. A. Lane; Treatment of Compound Fractures of Hand and Foot by Dr. F. M. Scott discussed by Dr. E. C. Janes; Pelvic Inflammation by Dr. A. F. Hollinrake discussed by Dr. R. T. Weaver; Complications of Thyroidectomy and Treatment by Dr. D. U. McGregor discussed by Dr. C. H. Jaimet; Breast Tumour by Dr. J. K. Murray discussed by Dr. O. W. Niemeier. A dinner was held at Collins Hotel, Dundas where Dr. H. B. VanWyck of Toronto spoke on Music as a Doctor's Hobby.

District No. 5 of Ontario Medical Association held the annual meeting at Streetsville on September 14. The morning was taken up with business. In the afternoon Dr. D. J. Leithauser of Detroit spoke on Physiological Principles underlying Early Postoperative Ambulation. Dr. E. K. Lyon of Leamington spoke on Public Relations. Dr. R. B. Kerr, Toronto spoke on Recent Advances in Medical Treatment. A garden party was held at the home of Dr. and Mrs. Oakley Dalgleish, Erindale on the Credit. Dr. F. W. Jackson, Ottawa, Director of Health Insurance Studies was the banquet speaker.

District No. 6 meeting was held at Peterborough on October 18 and 19. The business meeting was held in the evening and the clinical meeting was held the fol-

lowing day at the Kawartha Golf and Country Club. Dr. C. C. Ross, London, spoke on Thrombophlebitis; Dr. F. S. Brien, London, spoke on Anticoagulants; Dr. W. P. Tew, London, spoke on The Management of Common Obstetrical and Gynæcological Difficulties. Dr. E. K. Lyon was the luncheon speaker.

District No. 7 held its meeting at Westport on September 21. Dr. E. M. Robertson, Kingston, spoke on Some Aspects of Law in Relation to Problems in Gynæcological Obstetrics. Dr. J. E. Plunkett of Ottawa spoke on Treatment of Congestive Heart Failure. Dr. E. K. Lyon was the dinner speaker.

The annual meeting of District No. 8 was held at Ottawa on October 12. Members of the staff of Ottawa University who spoke were: Dr. Anthony Fidler, Professor of Clinical Medicine, Cardiac Murmurs: Differential Diagnosis and Interpretation; Dr. J. Burke Ewing, Professor of Clinical Surgery, The General Practitioner Looks at the Acute Abdomen; Dr. M. Murnaghan, Professor of Biochemistry, Relative Values of Liver Function Tests. Dr. E. K. Lyon, Leamington, President-Elect, Ontario Medical Association was the speaker at the dinner meeting held at the Chateau Laurier Hotel.

District No. 10 met at Kenora on October 1. Dr. A. D. McLachlan of London, Ont. spoke on Some Surgical Conditions in Children and Dr. J. M. Kilgour, Winnipeg spoke on Viral Hepatitis. Medical and surgical clinics were held in the morning at Kenora Hospital.

District No. 11 held their meeting in two parts in Toronto. The business meeting was held on October 26 and the clinical meeting took the form of a lecture in the evening of November 1. Dr. E. K. Lyon spoke on Public Relations and the Physician. He said that as individuals doctors were liked by their patients but as a group there was a wide-spread belief that they were an overprivileged class of people. In some instances the public had a grievance and the doctors should correct this. In one town the complaint was that a call could not find a doctor on Wednesday afternoon or at night. The local society made out a roster and gave the public the information of how to get a doctor at any time. The medical profession is also being criticized for their attitude about the European doctors who wish to practise in Canada. He felt that the facts should be known by the public.

Dr. Malcolm Cameron gave the report of the College of Physicians and Surgeons. He stated that in the past year the College had had applications from 70 non-Canadians to write the Ontario Council examinations. Of these 36 received enabling certificates to write the examinations and three passed. One of these is a Chinese doctor now interning, one is a professor at University of Ottawa and one is practising in Hamilton.

Toronto Academy of Medicine

Dr. J. A. L. Magee of Beaconsfield, Bucks., England, addressed the section of general practice of the Toronto Academy of Medicine on National Health Insurance in Great Britain. He explained the administration of the scheme and how the work of the regional boards, the local boards, the hospitals and the doctors, both the specialists and the general practitioners fitted into the plan. He felt that it had been introduced with indecent haste. A practitioner may have as many as 4,000 names on his panel and some in residential areas have as few as 1,500. Eighteen shillings is paid for each patient on the list. It is the custom in England to have the doctor's office in his home. In some cases the doctor's wife is becoming a drudge helping her husband to look after forms, manage the calls and admit the patients. He did not make it quite clear why the services of an office nurse are not allowed. A physician can take a pension at sixty and retire. "After the long grind it would be quite a temptation", he said, "but a retired doctor at that age would be a nuisance to himself and to everybody else". He thought the scheme was a good thing for the people and that British doctors were determined to make it a success. It was not the principle of the plan that he took issue with, it was the details of the scheme and its administration that were causing hardship to the practitioner.

A combined meeting was held in Toronto on September 22, 1949, of the General Practitioners' Sections of the Academies of Medicine; Buffalo, Hamilton and Toronto. A Golf Tournament was held at St. Andrew's in the morning. In the afternoon there was a Scientific Program at Sunnybrook Hospital conducted by Toronto Doctors: Drs. G. A. Dixon and C. E. Snelling discussed Eczema in Childhood. Dr. M. A. Scandiffio Treatment of Syphilis by the General Practitioner and Dr. Paul McGoey, Painful Back.

After a tour through the hospital Prof. H. B. Van Wyck discussed, Some Common Problems in Obstetrical Practice; Dr. J. F. McCreary, Vomiting in Babies and Diarrhœa in Babies and Prof. R. Farquharson, Obesity.

A dinner was held at the Royal York Hotel.

Toronto Diabetes Association

Professor Ernest Hanhart, University of Zurich, Switzerland, addressed the Toronto Diabetes Association on the Hereditary Aspects of Diabetes on October 24. In Switzerland where the people do not move around and where they have had good hospitals and doctors since 1880 it is not difficult to trace family pedigrees back for seven generations but in North America it is hard to get a medical history farther than four generations. H showed pedigrees he had worked out since coming to Boston to be the guest of Dr. Joslin. These pedigrees had information regarding about 35 or 40 members of the present generation with the presence or absence of diabetes with data going back four generations. He showed that the commonly held belief that two diabetic parents produced all diabetic children was not true. It depends on whether the parents are heterozygotes or homozygotes. He mentioned the phenomenon of anticipation where diabetes occurs twenty-two years earlier in every generation.

Lambton County Medical Society

Lambton County held its first annual clinic day at Sarnia on September 14. More than sixty doctors registered including eleven from St. Clair County Medical Society in Michigan across the river. Dr. Charles Ross spoke on Phlebothrombosis and Thrombophlebitis. Dr. Frances S. Brien spoke on Anticoagulants and Dr. Angus D. McLachlan spoke on Some Surgical Conditions of Children. The evening session was devoted to discussion of Diseases of the Peripheral Vascular System. All of the speakers were from the University of Western Ontario.

Perth County Medical Society

A meeting of the Perth County Medical Society was held in the Memorial Hospital, Listowel on September 21, where the visitors were guests of the Listowel members at a dinner. Dr. A. D. McLachlan spoke on Surgical Problems of Children.

Ontario Association of Pathologists

The Ontario Association of Pathologists held their twelfth Annual Meeting in the Hotel London, London, Ont., on October 28 and 29. Scientific sessions were held on the first day and also a luncheon, annual dinner and business meeting. On the second day a seminar on renal diseases was conducted by Dr. E. T. Bell, Professor Emeritus of Pathology, University of Minnesota.

University of Toronto

The Medical Alumni Association of the University of Toronto held their fourth Annual Postgraduate Meeting at Sunnybrook Hospital on October 27, 28, and 29. This course was well attended and Sunnybrook Hospital extended their usual and much appreciated hospitality.

The Physiological Society of the University of Toronto continues to attract speakers from all over the world. On September 26, Dr. A. S. Parkes, National Institute for Medical Research, London, England, spoke on Hypothalamic Obesity. Dr. G. Popjak of the same Institute, spoke on Lipid Synthesis in the Fœtus Studied with the Aid of Isotopes. Dr. Laurence Irving, Professor of Zoology, Swathmore College, Consultant to U.S. Army, spoke on October 31 on Insulation of Arctic and Tropical Animals and on November 3 on Relation between Insulation, Metabolism and Temperature Regulations. Dr. Edith Bulbring, Department of Pharmacology, University of Oxford on October 24, spoke on Some Interactions between Adrenaline and Acetylcholine, and the Formation of Adrenaline in the Suprarenal Gland. Dr. K. Rodahl, The Institute of Physiology and the Norwegian Polar Institute, Oslo, Norway, spoke on The Toxic Effect of Polar Bear Liver. Professor C. H. Best addressed the Society on ACTH and Cortisone. He had just returned from a conference on this subject called by the United States Department of Health in New York. ACTH possesses curative properties for rheumatoid arthritis, lupus erythematosus, psoriasis and pericarditis but it raises the blood pressure, causes glycosuria and depresses the formation of eosinophils. Regarding its synthesis he felt it would not be too long delayed since it is composed of but five amino acids as compared with insulin's seventeen.

La société médicale des hôpitaux universitaires de Québec

Société médicale des hôpitaux universitaires de Québec le 18 mars, 1949.

Pouvons-nous diminuer notre taux de mortalité maternelle?—René Marchand.

Bien que nos taux de mortalité maternelle aient considérablement baissé depuis les vingts dernières années, il est encore possible d'améliorer le sorte des mères canadiennes, qui payent encore trop cher leur tribut pour la continuation de la race. La moyenne de 5.7 décès de femmes enceintes par 1,000 naissances vivantes, que le Canada enregistrait en 1930, est descendu à 1.5 en 1947. Pendant cette même année 47, le Québec, avec un taux de 2.2, occupait le dernier rang parmi toutes les provinces du Canada. En comparant ces mêmes moyennes de mortalité maternelle, la ville de Québec figure beaucoup mieux, étant classée la huitième des dix-huit principales villes du pays. La septicémie puerpérale, la toxémie de la grossesse, et l'hémorragie étaient et demeurent les trois principales causes de décès chez la femme enceinte. Puisque ces trois conditions pourraient facilement être prévenues et controlées par une meilleure surveillance de la part du médecin, par la conviction chez la patiente de la nécessité des soins prénataux et par la multiplication des organisations médico-sociales qui s'occupent des indigents, il serait possible de diminuer encore nos taux de mortalité maternelle.

Les succès importants réalisés pendant le dernier quart de siècle sont très encourageants et nous laissent prévoir un avenir plus rassurant.

Nouvelles acquisitions relatives à l'hypertrophie du thymus.—Euclide Déchêne.

De tous les organes, le thymus est celui qui a causé et cause à tort le plus de soucis aux parents et aux médecins. La théorie classique qui voulait que le gros thymus fut un thymus pathologique est aujourd'hui désuète. Hammar et Boyd ont démontré par des travaux récents que le contraire était la vérité. En effet, le gros thymus est le normal, et le petit thymus, le pathologique. Les symptômes respiratoires, stridor, dyspnée, dysphagie, cyanose et même la mort subite sont difficilement explicables par une compression trachéenne, nerveuse ou autre par le thymus.

Des pédiâtres de réputation internationale affirment n'avoir vu aucun cas d'hypertrophie réelle du thymus. La radiothérapie profonde n'est pas recommandée comme moyen de traitement de la pseudo-hypertrophie thymique. L'hypertrophie réelle du thymus, si elle existe, est exceptionnelle. Son diagnostic relève beaucoup plus de la clinique que de la radiologie.

Société médicale des hôpitaux universitaires de Québec le 8 avril, 1949.

Maladie kystique des poumons.—Roland Desmeules.

Sous l'appellation de maladie kystique des poumons, l'auteur groupe des lésions de nature différente. D'une part, les kystes congénitaux, dus, il va sans dire à un trouble embryologique. D'autre part, les kystes acquis, causés par l'emphysème bulleux. L'auteur rapporte dix observations et souligne qu'elles sont la preuve que la maladie kystique des poumons n'est pas aussi râre qu'on le croyait autrefois. Le diagnostic se fait par l'histoire clinique, l'exploration radiologique, la bronchoscopie avec parfois l'aide de la pleuroscopie. La démarcation linéaire des contours des images anormales est l'élément fondamental du diagnostic.

L'auteur croit que les kystes, sans symptômes cliniques, non infectés et de volume peu marqué, ne doivent pas être opérés. L'opinion que les kystes latents peuvent se transformer en néoplasmes malins, n'est pas prouvée scientifiquement. Cette crainte ne doit pas forcer le chirurgien à intervenir. L'expectative est à rejeter si la maladie kystique donne des signes de compression et surtout s'il existe une complication infectieuse. Il s'agit alors, à moins de contre-indication, d'orienter le malade vers la chirurgie d'exérèse pulmonaire. Les progrès actuels en chirurgie thoracique sont tels qu'ils permettent de conseiller en toute confiance la lobectomie ou la pneumonectomie.

Quatre cas de méningite tuberculeuse traites par streptomycine.—L. Rousseau, M. Giroux, C.-H. Dorval.

Dans les quatre cas la mort a été l'aboutissement de la méningite. Une enfant avec une réaction méningée streptococcique et bacillaire a vécu 3 mois malgré un traitement par pénicilline et streptomycine. Chez une femme agée de 36 ans, la méningite a été très bien tolérée durant plus d'un an, l'infection bacillaire devenant résistante à l'antibiotique. Un abcès froid cérébral, malgré un traitement par streptomycine, s'est ultérieurement compliqué d'une méningite tuberculeuse mortelle. Une femme de 30 ans porteuse d'une granulie pulmonaire et ne présentant que 1.6 élément blanc dans le liquide céphalo-rachidien a guéri sa granulie pulmonaire pour mourir ultérieurement de méningite tuberculeuse.

Société médicale des hôpitaux universitaires de Québec le 22 avril, 1949.

Lithio-cancer de la vesicule versus ictère.—Henri Laliberté et A. Marois.

L'ictère, une affection du foie ou de ses voies d'excrétion et l'ascite constituent un syndrome très fréquent. Leur association avec ou sans splénomégalie conduit souvent à des individualités cliniques bien différentes. Nous avons étudié ce syndrome au sujet d'une patiente du service de médecine à l'Hôpital de l'Enfant-Jésus. Nous avons examiné cette triade symptomatique sous tous ses angles et après les diagnostics différentiels les plus pertinents, nous avons conclu à un lithio-cancer de la vésicule biliaire; l'ictère et l'ascite en étant les témoins les plus importants. Au décès de cette malade par hématémèses répétées, nous avons eu la confirmation nécropsique de notre

diagnostic clinique. Toute intervention chirurgicale a été jugée inopportune, le cancer devait être trop avancé.

Mycosis fungoide à tumeur d'emblée.—M. Beaudry.

Maladie assez rare qui doit être bien connue car son pronostic est grave. Un malade de 66 ans, apparemment en bonne santé souffre de lésions erythrodermiques peu prurigineuses disposées en plaques, et d'une large tumeur ulcérée à la jambe droite. Celle-ci disparait après Roentgenthérapie (4,000 R). Le mycosis fungoide peut être considéré d'après Darier comme une lymphadénie atypique voisine mais non distincte de la lymphogranulomatose; d'après les docteurs Vallée et Berger comme une réticuloendothéliose dermique pouvant secondairement mais non nécessairement s'étendre à d'autres stages du système réticuloendothéliale. Le diagnostic est à faire de la sarcomatose et de la maladie de Hodgkin. Le traitement consiste à faire de la radiothérapie sur les tumeurs, qui finissent par disparaître mais de nouvelles tumeurs apparaissent ailleurs.

NOTES ON GENERAL PRACTICE

[*This column will be devoted to points concerned with general practice. Questions are welcomed. They will be answered by well qualified men. Other short contributions or notes on general practice will also be welcome. General practitioners are particularly invited to make use of the column. All communications should be signed, but the writer's name will be omitted on request.*—EDITOR.]

Q. Some months ago your "Journal" contained articles on the incidence of pathogenic organisms in plaster of Paris. Has there been any further developments in this matter? Is it still considered medically and legally safe to use unsterilized plaster of Paris? O.C.M.

A. Since the appearance of Professor Murray's paper various inquiries have been made by manufacturers as to sterilization of plaster bandages, but no method has yet been generally accepted. We publish in this issue two papers on the use of formalin vapour, which promises well. Suggestions to incorporate bacteriostatics or antibiotics are open to objection. While no further instances of tetanus from this source have been recorded reports have been received by correspondence of troublesome mould infections from plaster in orthopædic cases. As Professor Murray showed, plaster of Plaster contains a large variety of these moulds.

There are no legal requirements with regard to the sterilization of plaster bandages, and infection of any kind from this source is admittedly rare. But its potential infectivity must always be recognized.

CANADIAN ARMED FORCES

News of the Medical Services

The Annual Meeting of the Western Quebec Branch of the Defence Medical Association was held in the R.C.A.M.C. Armouries at Montreal on October 20, 1949. The meeting was addressed by Brigadier C. M. Drury, C.B., D.S.O., Deputy Minister of National Defence who spoke on certain aspects of the Atlantic Pact and took part in the discussions which ensued. S/Capt. D. R. Webster was elected President for the forthcoming year. Colonel C. P. Gaboury as Vice-President and Colonel C. U. Letourneau, Secretary-Treasurer. The following were elected to the Executive Committee: W/Commdr. J. G. Turner, Lieut.-Col. W. M. Couper and Lieut.-Col. C. R. Stephen.

The discussion centered mainly on the advisability of conforming to the United States Armed Forces in matters of organization and equipment. Lieut.-Col. Cavender, U.S.M.C., made an illuminating comparison between medical organization in the United States Army and that in the Canadian Army. The meeting recommended that greater efforts should be made to standardize equipment and organization for common use by Canadian, United Kingdom and United States Armed Forces Medical Services. The meeting also recommended that a comprehensive course covering the various aspects of military medicine should be included in the curriculum of every medical school. Further discussions included consideration of air ambulance service and transportation of wounded, both military and civilian, aviation medicine, paratroop training, radiation injuries and bacterial warfare.

S/Capt. Webster thanked the Commandant of the R.C.A.M.C. Armouries for the assistance which they had rendered to the Association.

Surgeon Captain A. McCallum, M.D.G. (Navy), and Group Captain A. A. G. Corbet, D.H.S. (Air), attended the XIIth Session of the International Bureau of Documentation on Military Medicine, Havana, Cuba, November 6 to 8, 1949, and the Annual Convention of the Association of the Military Surgeons of the U.S.A., Washington, D.C., November 10 to 12, 1949, respectively. Both Medical Directors represented the Medical Services of the Canadian Armed Forces at the meetings.

Brigadier W. L. Coke, D.G.M.S. (Army), and Colonel E. M. Wansbrough, D.G.D.S., represented the Canadian Armed Forces at the XIIth International Congress of Military Medicine and Pharmacy held at Mexico City from October 23 to 29, 1949.

Lieutenant General Sir Neil Cantlie, K.B.E., C.B., M.C., F.R.C.S., K.H.P., who represented the British Army at the International Congress, spent the first week of November in Canada, where he visited Army Headquarters and R.C.A.M.C. establishments in Montreal, Kingston, Toronto and Camp Borden. Following his Canadian visit, he attended the annual convention of the Association of Military Surgeons of the U.S.A. at Washington, D.C., November 10 to 12 and made a tour of U.S. Service medical facilities.

The 5th meeting of the U.S. Armed Forces Medical Materiel Group held at Bethesda, Maryland, November 14 to 19, 1949, was attended by the following Canadian representatives: *Navy*—Surgeon Captain A. McCallum, R.C.N., Surgeon Comdr. J. E. deBelle, R.C.N. (R) (Ret'd.); *Army*—Brigadier W. L. Coke, R.C.A.M.C., Lieut.-Col. C. G. Wood, R.C.A.M.C.; *Air Force*—W/C B. R. Brown, R.C.A.F., S/L J. D. Duncan, R.C.A.F.; *Dental*—Colonel E. M. Wansbrough, R.C.D.C., Colonel C. B. H. Climo, R.C.D.C.

The annual meeting of the Defence Medical Association of Canada, held at the Royal York Hotel, Toronto, on October 28 and 29, 1949, under the chairmanship of the President, Brigadier H. M. Elder, C.B.E., D.S.O., of Montreal, was attended by delegates representing all the branches throughout Canada, as well as many other officers and ex-officers of the Medical Services. The following officers were elected for 1950: Honorary President—Major-General C. P. Fenwick; Hon. 1st Vice-President—Wing Commander W. R. Franks; Hon. 2nd Vice-President—Colonel L. H. Leeson; President—Surgeon Captain D. R. Webster; 1st Vice-President—Group Captain A. D. Kelly; 2nd Vice-President—Lieut.-Col. E. F. Ross; 3rd Vice-President—Major W. R. Dalziel; Hon. Secretary-Treasurer—Colonel J. Paul Laplante; Executive—(Chairman) Group Captain F. A. L. Mathewson; (Members) Surgeon Commander W. C. MacKenzie, Lieut.-Col. H. M. Edmison, Major G. G. Ferguson, Lieut.-Col. R. M. Taylor, Lieut.-Col. Mason Couper.

The 3rd annual conference of the Director General of Medical Services, and Command and Area Medical Officers of the Canadian Army is being held at Army Headquarters, Ottawa, on December 15 and 16, 1949.

Wing Commander J. A. Sifton, R.C.A.F., proceeded on duty on October 18, 1949, to Santiago, Chile, representing the Navy, Army and Air Force Medical Services at the International Radiological meeting.

Wing Commander G. D. Caldbick, D.P.H., of the staff of the Director of Health Services, R.C.A.F., attended the annual meeting of the American Public Health Association, held in New York City in October, 1949. He represented the Navy, Army and Air Force Medical Services in the field of public health and preventive medicine.

Wing Commander G. D. Caldbick was recently authorized by the Deputy Minister, Department of National Defence, to be National Defence representative on the Technical Advisory Committee on Public Health Laboratory Services of the Department of National Health and Welfare, for a period of the next two years. He is replacing Lieut.-Col. E. J. Young, former D.N.D. representative on this committee.

The second School of Aviation Medicine for Department of Transport Civil Medical Examiners was opened at the Institute of Aviation Medicine, Toronto, October 17, 1949. This school is being attended by 32 civilian medical men from all parts of Canada and, in addition, by five Regular Force Medical Officers. This course is organized through the co-operation of the Departments of National Health and Welfare, Transport and National Defence.

CORRESPONDENCE

On Transfusion

To the Editor:

I have just read Dr. Bruce Chown's article, "Never Transfuse a Woman With Her Husband's Blood". In looking for a probable cause, other than the Kell factor, it seemed to me that the psychological or psycho-somatic element should receive some consideration. I refer, of course, to the mental anxiety of the husband and its concomitant endocrine disturbances—especially of the adrenals. The latter affect the production of progesterone and the androgens—as is known—and hence would possibly involve pregnancy, etc.

If my theory is correct, then the advisability of giving sedatives to *all* blood donors, suggests itself.

SAMUEL POZNANSKY

Whitehorse, Yukon Territory.

An Osler Commemorative Stamp

To the Editor:

At one of the largest assemblies at McGill University on October 6, 1949, many notable personages were present, such as professors, scientists, physicians and surgeons from Canada, United States, Great Britain, France, etc., all to render homage and tribute to the memory of Sir William Osler, one of the most distinguished sons of Canada.

It was suggested that something tangible should take form and it was proposed that a commemorative stamp be issued, dedicated to the memory of Sir William Osler. This would be regardless of any memorial in the future. Canada cannot withhold any recognition of this great Canadian, whose name is a household word in North America, Great Britain and France.

It is confidently hoped that the members of the Canadian Medical Association will write the Postmaster General and their representative in Parliament to make a success of this worthy project. For "Now is the time and this is the place."

HARRY MORELL

To the Editor:

During the months of August and September, I was privileged to be the representative of The British Medical Association at a number of C.M.A. Divisional Meetings in the Maritime Provinces, as well as at special meetings which were arranged in my honour in Quebec, Montreal, Toronto and Winnipeg. I only regret that time did not allow me to attend the Divisional Meetings in Western Canada.

I should be grateful if I might express, through your columns, my very great appreciation of the generous hospitality which was accorded to myself, my wife and my daughter in all the places we visited, as well as the warmth and friendliness of our reception. During the course of my tour, I have added greatly to my already large circle of Canadian friends, and I take this opportunity of saying that I and my wife will greatly welcome the chance of returning hospitality and kindness to them and theirs, should they visit the old country.

LIONEL WHITBY,

Past-President, British Medical Association.

SPECIAL CORRESPONDENCE

The London Letter

(From our own correspondent)

FEES FOR PRESCRIPTIONS

In spite of the Minister of Health's categorical statement at his press conference early in October that, "if by tax is meant payment by the patient at the moment when the patient needs treatment, we set our faces against it", the Government has subsequently decreed as part of their economy measures that a patient will now be required to pay a small token fee up to 1/ for prescriptions. This is a move which has been generally welcomed by the medical profession as a first step towards controlling the unnecessary calls now being made upon the services of doctors. That some such control is required is clearly indicated by the figures provided by the Minister himself: 187 million prescriptions were dispensed in the first year of the National Health Service at an average cost of 2/9. In addition, 206,878 medical appliances were dispensed, including 8,359 artificial limbs, 7,226 artificial eyes, 5,071 wigs, and 21,345 surgical boots. This takes no account of the 9,900,000 spectacles that were ordered under the Service during the year ending September 1, 1949.

INFANT VACCINATION

A disturbing state of affairs is revealed by a report in the monthly bulletin of the Ministry of Health, reviewing the position of vaccination against smallpox which ceased to be compulsory when the National Health Service came into operation in July, 1948. The percentage of children vaccinated under the age of one year, compared with total births, rose from 34 in 1937 to over 41 in 1946. For the last six months of 1948, the latest figures available, this figure has fallen to 18 for England and 10 for Wales. In view of the fact that there are wide variations in the returns from different parts of the country, *e.g.*, from 45 to 1.4, it has been suggested that the over-all low figure for the country may be due, in part at least, to the public not being aware of the procedure to be followed under the new régime. Time will soon clarify this point, but it is clear that active steps will have to be taken shortly if the country is not to be in a dangerous condition so far as susceptibility to small-

pox is concerned. The international aspect is equally important for, as a Ministry of Health official has pointed out, "by our apparent neglect of this procedure we are giving the impression abroad that we do not regard protection against smallpox as a serious matter at the present time".

INSTITUTE OF DISEASES OF THE CHEST

A further step in the development of the British Postgraduate Medical Federation took place last month when the new premises of the Institute of Diseases of the Chest were opened in the grounds of the Brompton Hospital. Postgraduate instruction has been a feature of this world-famous chest hospital for many years, but its organization on a more formal basis will allow of its receiving full academic status and so enhance its prestige as the principal training centre in England for chest specialists. The new buildings include laboratories which occupy about half of the accommodation, a library, a museum, a lecture theatre, a common room for students, a refectory, and administrative offices. At the moment some forty postgraduates attend each term, and the staff of both the Brompton Hospital and the London Chest Hospital take part in the teaching.

DOCTORS, DRUGS, AND AUTOMOBILES

A recent decision of the High Court of Justice has given rise to much comment in medical circles. As the law stands at the moment a doctor is required by regulation to keep dangerous drugs "in a locked receptacle which can be opened only by himself or by some other person authorized". Last January a Birmingham doctor's car was stolen from a car-park. The car was locked, and inside the car was an unlocked leather case containing dangerous drugs. Subsequently the car was found, with the doors open and the drugs still present in the unlocked case. At the local police court the doctor was fined £5 for having failed to keep the drugs in a locked receptacle. The doctor appealed to the High Court, but only to have the police-court decision confirmed on the grounds that it was impossible to say that a motor-car was a "receptacle" within the meaning of the regulation, although it might be described as a receptacle for luggage. As *The Lancet* points out, "the appellant is probably wondering what is the judicial conception of luggage". Certainly, many practitioners are wondering exactly where they stand in the view of the law when they are carrying dangerous drugs about with them in the course of their practice. To quote *The Lancet* again, "coat pockets cannot be locked receptacles". WILLIAM A. R. THOMSON

London, November, 1949.

A Letter from Ceylon

[*We are glad to publish the following letter from Dr. C. C. de Silva, President of the Ceylon Branch of the British Medical Association. Dr. de Silva represented Ceylon at the recent British Commonwealth Medical Conference in Saskatoon.*—EDITOR.]

Greetings from the Ceylon Branch of the British Medical Association to the Canadian Medical Association. We hope this will be the first of many letters exchanging news and good wishes between our two Associations.

Our Association is nearly 63 years old and has had such famous men as Dr. Albert Chalmers, Sir Aldo Castellani and Sir Maecus Fernando as its past presidents. During 1950, we expect to change our name to the Ceylon Medical Association, but we shall continue to be an Incorporated Branch of the B.M.A. With the political advance of the country from Colonial to Dominion status, this has become a very necessary step welcomed not only by our members but also by the Parent Association in London. We shall always remember with gratitude the many acts of kindness and help received from London.

Our membership now stands at about 530 members but there are nearly 1,100 doctors in the Island. This works out at a little more than one doctor per 7,000 of the population, but it must be remembered that the majority of the population still favour the Ayurvedic system of medicine. The practitioners of this are not yet registered though the State intends bringing in legislation at a very early date to do so. There is a State Medical Service which employs over 400 doctors including 80 Health officers and administrative officers. Except for the latter the rest are on part-time basis and are allowed private practice. The over-crowding and understaffing have reached such a desperate stage, that the Government has appointed Dr. J. H. L. Cumpston, C.M.G. from abroad as its Medical Adviser to examine the medical and health services of Ceylon generally, and in particular several other matters, such as the relationship between the curative and preventive work of the Department, the organization and administration of the Head Office and Provinces, of various hospitals of special services, *e.g.*, tuberculosis, malaria, leprosy, etc. Dr. Cumpston is expected to remain here about a year and has invited memoranda from various professional organizations and others.

We are also witnessing at present a peaceful invasion by various specialists imported from Vienna for specific periods of service to organize clinics and train personnel in their various specialties.

The Association itself is holding its Anniversary Meetings in October, 1949, at which papers will be read on Filariasis, Cardiac Ischæmia and some deformities (Orthopædic) in infancy and childhood.

Our President Dr. de Silva has very happy recollections of meeting the President and the members of the Executive Committee of the Canadian Medical Association at Saskatoon and will report that he was completely overwhelmed by your hospitality. We hope that some of you will give us the opportunity soon to return this hospitality. Ceylon may be far from Canada in space, but there is much for any person of culture and wide interests to see and love here. Neither your time nor your money will be wasted by a trip here, by Air it will take you three days. C. C. DE SILVA

ABSTRACTS FROM CURRENT LITERATURE

Medicine

A New Skin Treatment for the Incontinent Patient. Nagamatsu, G., Johnson, T. and Silverstein, M.: *Geriatrics*, **4**: No. 5, 1949.

A study of the pathogenesis of skin excoriation in areas bathed by urine was undertaken. Based on previous studies and the observation of patients with draining urinary fistulæ and of neurological incontinents the authors believe that the skin lesions are essentially an ammonia dermatitis resulting from the action of urea-splitting organisms on the nitrogen containing components of urine. The source of these organisms is thought to be intrinsic in the draining urine, fæcal contaminants, or urea-splitting organisms normally found on the skin. The action of an antiseptic, para di-isobutyl-cresoxy ethoxy-ethyl-dimethyl benzyl ammonium chloride monohydrate, diaparene, which is effective against most ammonia-splitting organisms is discussed. Observations with surgical gauze dressings impregnated with diaparene (one tablet to each pint of water) are reported. Diaparene impregnated dressings, diapers, or towels are effective prophylactically and therapeutically for all degrees of urinary excoriation ranging from minimal erythema to deep ulceration. A water-miscible ointment with this same chemical may be used as an adjunct for prevention and treatment.

Subtotal Gastrectomy and Vagotomy for Peptic Ulceration. Warren R. and Meadows, E. C.: *New England J. Med.*, **240:** 372, 1949.

The incidence of unfavourable side effects is comparable following gastrectomy or vagotomy. A mortality of 3.3% is reported for a series of 89 subtotal gastrectomies and no deaths among 28 vagotomies. Recurrent peptic ulceration followed gastrectomy in one instance as compared with three such recurrences after vagotomy. Vagotomy should be restricted to patients with anastomotic ulcer and to young patients without pyloric stenosis who have a strong emotional phase of gastric secretion accompanying peptic ulceration. NORMAN S. SKINNER

Pneumococcal Pneumonia Treated with Aqueous Penicillin at Twelve-Hour Intervals. Tumulty, P. A. and Zubrod, G.: *New England J. Med.*, **239:** 1033, 1948.

The intramuscular administration of 300,000 units of aqueous penicillin G every twelve hours is the treatment of choice for pneumococcal pneumonia and produced equally as excellent results in a group of 79 patients as were obtained in a control group of 69 given intramuscular penicillin at the conventional three-hourly interval. While good results followed the use of 300,000 units in oil and beeswax once daily in 58 patients the absence of an early high penicillin blood level is considered undesirable. Only two deaths occurred, both in the first group, each being a poor risk because of complicating illness. One of these deaths took place within three hours of admission and the other within six.

While the validity of the conclusions drawn from this study does not warrant criticism, the different series of patients were obtained at different periods of time and with some degree of selection. NORMAN S. SKINNER

Hepatitis Without Jaundice and Without Hepatomegaly. Domenici, T. J.: *New England J. Med.*, **240:** 88, 1949.

Hepatitis without jaundice is generally considered to be a mild disease, running a course of six to eight weeks and having an enlarged tender liver as an important physical sign. Four cases of non-icteric hepatitis, occurring among fifty nurses living in one residence, differed from the usual in that the illness was relatively severe and followed a protracted course of four to six months. In no case was the liver palpable but all four had an area of localized tenderness, without rigidity, in the right upper quadrant along with tenderness on percussion over the right lower ribs. The cephalin-cholesterol flocculation test proved to be the most sensitive and reliable index of both the liver function and the clinical course. The latter was marked by exacerbations and remissions of symptoms and all patients displayed noteworthy psychological reactions which hampered therapy. NORMAN S. SKINNER

Evidence on the Genesis of Certain Common Nasal Disorders. Holmes, T. H., Goodell, H., Wolf, S. and Wolff, H. G.: *Am. J. M. Sc.*, **218:** 16, 1949.

The pattern of nasal hyperfunction with hyperæmia, swelling, hypersecretion and obstruction, from whatever cause, may predispose the individual to "common cold" as well as to chronic recurrent disorders of the nasal and paranasal spaces. It has been demonstrated that various threats to bodily integrity, including emotional conflict, may produce this pattern of defence. More than 4,000 observations on 112 patients were carried out in an attempt to determine the relevance of nasal changes which accompany emotional stress, to tissue damage and nasal disease, and to explore the underlying neural mechanism. The examinations were made under uniform conditions and cognizance taken of the life setting in which these alterations occurred, attention being focused on the emotional reactions, attitudes and behaviour of the individual.

Life situations productive of conflict with anxiety, humiliation, frustration, resentment and guilt were commonly accompanied by nasal hyperfunction. An associated pyogenic-like reaction was also observed and was confirmed by biopsy and by examination of nasal secretions. Nasal pain of two types was frequently present and was not dependent on infection of the nasal or paranasal spaces. The nasal hyperfunction, if unduly prolonged, produced pathological changes which give rise to or prolong troublesome symptoms and, coupled with other factors, become important to the pathogenesis of chronic nasal disease.

Nasal hyperfunction constitutes a part of a broad biologic protective mechanism. In effect, the individual diminishes his exchanges with his environment and limits the extent of his participation in the situation about him. The pattern represents an attempt on the part of the organism to protect itself by shutting out, neutralizing and washing away an environment that is literally or symbolically noxious. Subjects exhibiting this pattern of non-participation were found to be defensive, insecure, sensitive and dependent individuals who talk with difficulty about relevant personal matters and seldom take positive steps to improve their state.

J. F. Simpson

Unresolved Pneumonia: An Exclusion Diagnosis. Hinkel, C. L.: *Am. J. Roentgenol. & Rad. Therapy*, **61:** 335, 1949.

Frequently when a patient is about to leave the hospital a chest film reveals persistent shadows in the lung. These shadows are more significant than is generally realized and are by no means easy to correctly evaluate. Too frequently the case is labelled "unresolved pneumonia" and the matter forgotten in view of the apparent well being of the patient. It is the responsibility of the roentgenologist to point out to the clinicians that recovery is incomplete and that treatment and study should be continued until the shadows disappear or are thoroughly understood. It is the purpose of this paper: (*a*) to emphasize the necessity of adequate investigation of post-pneumonic shadows; (*b*) to outline a planned course for their study; (*c*) to discourage the indiscriminate use of the term "unresolved pneumonia".

To the radiologist the common denominator of all pneumonia is the exudate. The diagnosis of pneumonia rests upon the finding of exudate and recovery depends upon its resolution. True unresolved pneumonia is fibrotic exudate situated in the alveolar and interstitial tissues and is rare. Unresolved pneumonia should not be diagnosed until other diseases of the tracheobronchial tree, especially bronchiectasis, atelectasis and intrabronchial lesions, have been excluded. The suggested course of procedure for exclusion studies is as follows: (1) stereoscopic study and oblique and lateral films to rule out pleural thickening, interlobar collection, marginal atelectasis and pulmonary infarct; (2) bronchoscopy, which functions both diagnostically and therapeutically, permits examination of the trachea and larger bronchi and excludes bronchial occlusion; (3) bronchography is performed if bronchoscopy has not been diagnostic, if bronchiectasis is suspected, if a pictorial record of the tracheobronchial tree is desired and in certain cases for academic reasons. Bronchography affords visualization of the small bronchi and bronchioles not accessible to the bronchoscope and permits accurate localization of bronchial and bronchiolar occlusion, bronchiectasis, or other abnormalities.

Only when it has been shown that the large and small bronchi are patent and normal are we justified in attributing the roentgen shadow to exudate or fibrosis in the pulmonary parenchyma. J. F. SIMPSON

Surgery

The Treatment of Acute Anuria. Fields, I. A., Martin, H. E., Simonsen, D. G., Wertman, M. and Westover, L.: *Ann Surg.*, **124:** 445, 1949.

This evaluation of peritoneal lavage is based on careful studies on seven patients of whom six had potentially reversible tubular lesions. The other proved to have acute glomerular nephritis at autopsy. Three of the six patients died and three lived.

Peritoneal lavage is successful in removing substantial amounts of nitrogenous waste products, helps to adjust a disturbed electrolyte balance, especially potassium, and supplies glucose. But it requires constant and expert supervision, often leads to peritoneal bacterial contamination when continued over four days and absorption of fluid from the peritoneum occurs if hypertonic fluids are given intravenously. Gastric lavage was much less effective than peritoneal lavage.

Acute pulmonary œdema was the immediate cause of death in four patients. Six of the seven patients developed generalized œdema at some stage. Fluid and sodium must be restricted. Peritoneal or gastric lavage should be used only if the patient shows some deleterious effect from nitrogen retention or electrolyte disturbance: hypopotassæmia especially or severe azotæmia when accompanied by toxic symptoms such as restlessness, disorientation, diplopia, convulsions, generalized twitchings. BURNS PLEWES

Plain Radiography in Intraspinal Protrusion of Lumbar Intervertebral Discs: A Correlation with Operative Findings. Beggs, A. C. and Falconer, M. A.: *Brit. J. Surg.*, **36:** 16, 1949.

Plain radiography may reveal the presence of spondylolithesis, sacro-iliac disease, inflammatory disease, neoplasm, fracture, but it may also suggest the likelihood of a disc protrusion in 4 out of 5 patients in which the condition has been diagnosed clinically. Degenerative changes may commence shortly after puberty. A prolapse into the spongiosa of the vertebral body becomes demonstrable radiologically as a Schmorl's node. Occasionally a posterior protrusion is visible when the nucleus pulposus is calcified. Such degenerative changes result in narrowing of the disc space, increased joint mobility, the development of bony outgrowths and sclerosis of opposing vertebral surfaces.

Of 100 consecutive operative cases, sciatica was predominant in 77, and low back pain in 23. Multiple prolapses were found in 20. In 97 the prolapses were at one or the other of the lower two lumbar vertebræ.

The technique of radiography is carefully described. Each abnormality is discussed; intervertebral narrowing, hypertrophic changes and sclerosis of adjacent vertebral bodies, localized scoliosis, relative displacement of a vertebra, spinal deformity, Schmorl's nodes, anterior intraspongy nuclear herniations, and disc ballooning. When plain radiography is supplemented by movement studies, the site of the protrusion may be deduced in a great percentage of cases.

BURNS PLEWES

A Study of Postoperative Pulmonary Atelectasis. Goodwin, J.: *Brit. J. Surg.*, **36:** 256, 1949.

Some degree of pulmonary collapse is the most frequent postoperative chest complication. It is always basal, more frequent in the right lung, and after an upper abdominal operation. In half the cases there is preoperative upper respiratory infection. There may or may not be x-ray changes. Infection occurs rapidly in collapsed lung. Postoperative bronchitis is rare. Treatment recommended is chemotherapy, penicillin, postural drainage and breathing exercises. The author does not recommend early bronchoscopy. An analysis of 63 cases of postoperative chest complications is presented. The physical and radiological signs are discussed. There is no advantage in adopting a sharply defined classification of pulmonary collapse.

BURNS PLEWES

Obstetrics and Gynæcology

Unilateral Acute Hydramnios in Uniovular Twin Pregnancy. Wurzbach, F. A. Jr.: *J. Obst. & Gyn. Brit. Emp.*, **56:** 242, 1949.

Acute hydramnios is a rare obstetrical anomaly and has been reported only in uniovular twin or triplet pregnancies. Acute hydramnios is not to be confused with severe degrees of chronic hydramnios or rapid accumulations of amniotic fluid where chronic hydramnios already existed. The clinical picture of acute hydramnios is presented. Schatz's theory of the "third placental circulation" is reviewed and Spanner's observations on the placental circulation are noted. The existence of an arterio-venous fistula in the placenta is recognized and an attempt to explain a donor-receptor arrangement between twin identical fetuses. In acute hydramnios the greatest portion of amniotic fluid is renal in origin. Two cases of acute hydramnios in uniovular or monochorial twin pregnancy are presented.

P. J. KEARNS

A Survey of Functional Uterine Bleeding with Special Reference to Progesterone Therapy. Jones, G. E. S. and TeLinde, R. W.: *Am. J. Obst. & Gyn.*, **57:** 854, 1949.

In seven years approximately 700 cases of functional uterine bleeding were seen in the outpatient department of the Johns Hopkins Hospital: 104 young women with severe symptoms were referred to the special functional bleeding clinic. When the 104 cases were classified, 66% were hyperplastic, 16% interval non-secretory, 12% secretory, and the remaining 6% were chronic endometritis and atrophic types. A total of 234 curettements was done on these 104 patients; 63% of the repeated curettages performed for a recurrence of symptoms showed no change in the endometrial pattern. Of the remaining 36% none of the untreated varied from the non-secretory to the secretory type.

Seventy-four of the 91 patients showing non-secretory endometrium were considered suitable for cyclic progesterone therapy as they were young women with severe symptoms which did not respond to other forms of treatment. In 72 cases the bleeding symptoms were satisfactorily controlled. Thirty-one patients had no recurrence of symptoms following the initial three month cyclic course of medication. Recurrences which occurred in forty patients were successfully treated again with progesterone. Oral progeninolone has been as satisfactory as intramuscular progesterone in the present series, in approximately 90% of the patients. Œstrogen was used in conjunction with progesterone only in the two cases of bleeding associated with an atrophic type of endometrium. Although progesterone therapy is excellent in functional bleeding associated with non-secretory endometrium, it is unsatisfactory in those patients who have abnormal bleeding associated with secretory endometrial patterns.

Staphylococci in the Newborn. Martyn, G.: *Brit. M. J.*, **1:** 710, 1949.

An investigation into the incidence of staphylococci in the nasopharynx and fæces of 130 normal healthy breast-fed infants aged 0 to 7 days born in the Maternity Department of St. Mary's Hospital, Manchester, is recorded. From the nasopharynx *Staph. pyogenes* was isolated in 62% of the infants and from the fæces in 50%. Of the *Staph. pyogenes* strains isolated from the nasopharynx 55.5%, and from the fæces 58.5% were penicillin resistant. All the resistant strains produced

penicillinase. Only four strains of *Staph. pyogenes* isolated were resistant to streptomycin.

In the cases that were specially tested there was homogeneity in the staphylococcal flora of the nasopharynx and bowel in individual infants so far as sensitivity to penicillin was concerned. In three-quarters of the infants who harboured *Staph. pyogenes* in both nasopharynx and bowel the strains from the two sources corresponded in their susceptibility to both penicillin and streptomycin. The high incidence of *Staph. pyogenes* in the fæces was due largely to the use of a selective medium, and the high incidence of penicillin-resistant strains probably reflects the strain circulating in the hospital. ROSS MITCHELL

Intermenstrual Pain (''The Mittelschmerz'') and the Time of Ovulation. Krohn, P. L.: *Brit. M. J.*, **1:** 803, 1949.

The cyclical occurrence of intermenstrual pain (Mittelschmerz) has been followed for 4½ years in a married woman aged 28. The onset of the pain is closely correlated with changes in the waking oral temperature, and is taken to be a reliable index of ovulation. ROSS MITCHELL

The Rôle of Penicillin in Obstetrics. Harris, L. M. and Shook, A. M.: *Am. J. Obst. & Gyn.*, **57:** 1186, 1949.

The advantages in the use of penicillin in obstetrics over other chemotherapeutic agents are discussed, as well as its efficacy and compatibility with other agents in combined therapy. The possibility of abortefacient or oxytocic properties of penicillin is discussed, and clinical evidence is presented which suggests that such reaction reported early in its use, for the most part in patients undergoing antisyphilitic treatment, was the result of impurities in the drug or of therapeutic shock. The significance of bacteriologic diagnosis and sensitivity is discussed with their relation to dosage and therapeutic efficiency of penicillin. Penicillin resistance may rise in the presence of inadequate dosage. The intramuscular route of administration has been found to be the method of choice in all but the most severe infections. An evaluation of the results of penicillin therapy in the various infections complicating pregnancy is presented in a statistical analysis. The value of the prophylactic and very early use of penicillin in sufficiently large doses when it is indicated has been fairly well established.

The possibility that pelvic inflammatory disease might be a factor in certain cases of infertility and in some cases of premature termination of pregnancy is suggested. While there are insufficient data from the study to prove such a thesis, further investigation may reveal that such infections are sufficient indications for active therapy; with our present armamentarium, this includes penicillin. ROSS MITCHELL

Psychological Medicine

Psychogenic Sneezing and Yawning. Shilkret, H. H.: *Psychosom. Med.*, **11:** 127, 1949.

This is a case report of what was essentially industrial compensation hysteria, but which was initially assumed by the patient's physician to involve allergy to gunpowder. There was profuse watery discharge from the eyes and a moderate engorgement of the turbinates, but allergic testing with all the ingredients to which the individual was exposed in her work failed to produce local changes or aggravation of symptoms. Suggestion was successful, however, in stopping or starting the symptoms, and in encouraging the patient to resume other work without the stimulus to perpetuation of symptoms which would have been provided by compensation payments. W. DONALD ROSS

Physical Symptoms Masking Early Psychiatric Disorders. Moench, L. G.: *Dis. Nerv. System*, **10:** 219, 1949.

There still appears to be a need for criticizing the tendency to overlook significant psychiatric disorders through concentration on some minor physical finding. The doctor's fear of overlooking a physical disorder has not yet been transferred to a justified concern against overlooking a disorder which requires psychiatric handling. The author of this paper reports five cases from the Salt Lake Clinic which illustrate how five different psychiatric conditions can be back of the common symptom of headache, and how they may be missed while investigation is being directed to physical aspects without alertness to the positive signs and symptoms of psychiatric disease. The five cases included the following: A patient with conversion hysteria who was finally relieved by short term psychotherapy; a psychopathic personality who was returned to the Veterans' Hospital after much fruitless investigation; a schizophrenic who was transferred to a state hospital; a psychoneurotic depression with ''constitutional psychopathic inferiority'' who was relieved by electric shock treatments but took flight from psychotherapy and relapsed later; and an involutional melancholic who was apparently cured by electric shock treatment. All of these could have been recognized and medical energies conserved if they had not been approached from the viewpoint of first ''ruling out organic disease'', or if they had not been the target of frustrated annoyance by doctors because the doctors did not understand them in purely organic terms. W. DONALD ROSS

Neurology and Psychiatry

Arteriovenous Aneurysms of the Brain; Their Diagnosis and Treatment. Olivecrona, H. and Riives, J.: *Arch. Neurol. & Psychiat.*, **59:** 567, 1948.

The cardinal symptoms of arteriovenous aneurysm are epilepsy, subarachnoid hæmorrhage and intracerebral hæmorrhage with hemiplegia. A systolic murmur was observed in only 8 cases of the series. It was always present when branches of the external carotid artery contributed to the blood supply of the malformation but was rarely noted when the aneurysm was located entirely within the distribution of the internal carotid artery. Calcification was observed in 6 cases. The first symptoms usually occurred at a comparatively early age, in the majority of cases during the second or third decade of life. In nearly half the cases the first symptom was an epileptic fit; in about a fifth, cerebral hæmorrhage with hemiplegia, and in another fifth, subarachnoid hæmorrhage. Epileptic fits were not only the commonest initial symptom but the most constant symptom of all. Headache was a frequent complaint but was not usually characteristic. Increased intracranial pressure was rare. Mental changes were frequent, and in inveterate cases they were often severe.

Encephalographic studies were carried out in most of the cases. The most frequent observation was cerebral atrophy, either general or localized. The authors point out that the diagnosis of an arteriovenous aneurysm should always be confirmed by arteriographic study preferably by the percutaneous injection of ''per-abordil''. They made both lateral and frontal exposures. With regard to treatment, the choice, the authors felt, lies between removing the lesion and leaving it alone. In their series the aneurysm was removed in 24 cases, with 3 fatalities. J. PRESTON ROBB

Comparison of Adjunct Group Therapy with Individual Psychotherapy. Peck, R. E.: *Arch. Neurol. & Psychiat.*, **62:** 173, 1949.

Group psychotherapy is being increasingly accepted as one of the standard methods of psychiatric treatment in spite of great difficulties in the assessment of its value. The author of this paper makes a con-

tribution towards demonstrating its worth by means of two series of patients under the Veterans' Administration, all of them receiving individual psychotherapy, but one series of them having group psychotherapy in addition. The two series were made comparable by chosing only patients in individual therapy alone who would have been considered capable of participating in group therapy. There was a definitely higher percentage of improvement in the series under group psychotherapy, and the percentage varied in various diagnostic groups. This work does not show that group psychotherapy is a substitute for individual psychotherapy, but indicates that it is a valuable adjunct to it.

W. DONALD ROSS

Industrial Medicine

Personal Factors of Accident Proneness. Csillag, I. and Hedri, E.: *J. Indust. Med.*, **18:** 29, 1949.

That personal factors play an important rôle in accident proneness has been recognized for some time. At the Surgical Hospital No. III, of the University of Budapest, which deals with some 20,000 casualties yearly, investigations have been carried out to reveal the significance of these factors. In this article the authors examine the method followed and discuss the findings. One hundred casualties of the recurrent type were examined. Certain tests were given and a question form used which inquired into the environment and the sociological and mental background of the accidents. Analysis of the information acquired in this way showed that the relation to the parents, the forms of appearance of aggressions and the choice of vocation inadequate to the patient's personality, have the foremost significance. Several case histories are included in the article to illustrate the way in which various factors have intertwined in producing the accident prone individual.

The authors sum up their survey as follows: "We found, that (1) 54% of the serial-accident patients have either lost their parents in childhood or the parents lived separated. (2) The motive of accidents is aggression turned against one's self. Our patients are not anti-social persons, because their moral sense is intact, and as they do not turn their aggression against others, they do not become criminals. (3) Forty of the examined people did not work in fields suitable to their emotional constitution. (4) Those of the patients whose fathers were drunkards are teetotallers. The accidents cannot be traced back to a single cause, but are of manifold determination. We find several factors intertwined in many of the cases. There would be need of preventive personality examinations, and of emotional treatment after the accidents".

MARGARET H. WILTON

Ultra-Violet Exposure from Germicidal Lamps. Hama, G. M.: *Indust. Med.*, **18:** 75, 1949.

That the control of exposures from germicidal lamps is dependent upon proper installation of the lamps, is indicated by this article. Most manufacturers recommend that the lamps be installed and operated only under conditions which provide adequate protection for the eyes and which minimize as much as practical the direct exposure to the skin. The recent prevalent use of ultra-violet germicidal lamps in food-handling industries has given added significance to the recommendations. The lamps frequently used are the low pressure mercury type, emitting radiation in a range which has been found to exert a powerful bactericidal and fungicidal effect. They are being used in the meat industry, the baking industry, breweries, and eating places. In the meat industry the use of the lamp permits a higher refrigerator storage temperature which greatly cuts down weight losses in the meat through dehydration. It is used to prevent mould contamination in breweries and in several operations of the baking industry, and, in the eating and drinking places, to sterilize utensils.

Excessive exposure is known to result in eye complaints and erythema. The author presents two typical cases to show the danger of improper installations. In his opinion each installation should be supervised or inspected by competent persons versed in the technology of the subject and equipped with suitable means for measuring radiation intensities. Where lamps are installed for air sterilization it is essential that the installation be made so that no one adjacent to the fixture in a normal position can see the lamp, either directly or by primary reflection from specular reflecting surfaces. In certain installations unshielded lamps may be used if the time factor is small and the suggested limit of 5 microwatt hours per 24 hours is not exceeded. On installations where special precautions are necessary, common glass, cloth, wood, metal or plastic partitions can be used for shielding. Individual protection of face and eyes can be afforded by glass or plastic goggles or plastic face shields. Special skin creams can also be used.

MARGARET H. WILTON

Antihistaminic Drugs in the Treatment of the Common Cold. Brewster, J. M.: *Indust. Med.*, **18:** 217, 1949.

That the initial phase of the common cold is an allergic reaction, and that antihistaminic drugs, by interrupting this allergic reaction, are capable of aborting the common cold when treatment is begun in the initial phase, is the opinion expressed in this article. The author believes that the incidence of the common cold will be reduced to a startling degree when the antihistaminic drugs are more widely prescribed for early medication, much as aspirin is at the present time.

In this article he reports the results of a study made at the U.S. Naval Hospital, Great Lakes, Illinois. Between October 1, 1947 and May 1, 1948, a total of 572 patients were treated with one of several antihistaminic drugs. All had been encouraged to report for treatment at the earliest possible moment after the onset of a cold. Approximately every sixth patient received a control medication. The dose of the drug, for adults, was arbitrarily set at 50 mgm. and that for the control medication at 16 mgm. each of codeine sulphate and papaverine hydrochloride. Each patient was provided with enough medicine to carry him until the next morning and was instructed to repeat the doses at four-hour intervals when awake, for at least 3 doses (more if symptoms persisted) and to report to the clinic the following morning.

A cold was considered to have been aborted or cured when all signs and symptoms disappeared completely within 24 hours of the beginning of treatment and remained absent for at least 48 hours after all treatment was stopped. It was found that the effectiveness of the treatment with antihistaminic drugs is inversely proportional to the lapse of time following the onset of symptoms before treatment is begun. In this study all symptoms were aborted in 90% of those patients in whom treatment was begun within the first hour after onset of symptoms, and in 87% of those treated within two hours of onset: 74% of the patients who received treatment within six hours, and 70% of those who received it within twelve hours of onset were also cured. In cases where treatment was begun too late to secure an arrest, the continued use of the drug shortened the period of morbidity and eliminated complications. All patients were warned that drowsiness was to be expected and were cautioned to avoid driving a car while under treatment.

MARGARET H. WILTON

Otolaryngology

New Diagnostic Procedure for Boeck's Sarcoid. Poe, L.: *Arch. Otolaryngol.*, **47:** No. 6, 1948.

There is no striking uniformity in the gross appearance of intranasal sarcoids other than to show some crusts and bleeding, but nevertheless we may distinguish two clinical forms: the diffuse form in which the whole

mucosa is thickened, dull red, causing a marked obstruction of the nasal fossa. The localized form in which yellowish, semi-translucent small nodules are seen in clusters. In both cases, the skin is thick, of reddish hue with a darkly pigmented spot. We may be sure of the diagnosis if with this clinical picture the following triad is encountered: microscopic study of granulations from the nose suggesting a Boeck sarcoid, an x-ray of the chest showing lymphomatous masses, and a negative reaction of the patient to tuberculin test.

The microscopic picture in tuberculosis and sarcoid are about the same, therefore the pathologist cannot make a definite diagnosis. A great help to arrive at a diagnosis is the finding of similar lesion elsewhere in the body. The main point for such a diagnosis is the correlation of the triad with the clinical picture and a lesion elsewhere. This usually is located in the phalanges (shown by x-ray) or in the skin. Tuberculin cannot alone sign the diagnosis, because tuberculin anergy is found in persons who are victims of maladies other than sarcoidosis. More cases of nasal involvement by Boeck's sarcoid will be found if this method is taken in consideration; infiltration of the nose by Boeck's sarcoid is more frequent than thought. RICHARD A. CHARLAND

OBITUARIES

Dr. D. J. Brass, Yorkton, Sask., died in hospital in Edmonton on September 13, while visiting his son. Born in Paris, Ont., he received his degree in medicine from North Western University, Chicago. He had practised continuously in Yorkton for the past 37 years. Dr. Brass was director of the Yorkton General Hospital until two years ago. He also served on the Yorkton Collegiate Board for 27 years. Surviving are his widow, one son, a daughter, his mother and two sisters.

Dr. I. Glen Campbell, aged 81, died in Vancouver on September 27. He graduated in medicine from McGill University in 1897. Born in Montreal, he was a noted athlete and known as one of Canada's fastest milers. Beginning his studies in engineering, he switched to medicine and went to Vancouver in 1899 after a period of internship in Montreal. A co-founder of the Vancouver Medical Association, he was president of that body in 1906-07, and helped inaugurate eye examinations for western school children in 1902.

From 1902 to 1930 he was lecturer to nurses on eye diseases at the Vancouver General Hospital remaining as consulting ophthalmologist until his death. He was made a senior member of the Canadian Medical Association in 1939 and in 1947 became a life member of the College of Physicians of British Columbia. He is survived by his wife, three daughters and three sisters.

Dr. Anne Mackenzie Cleland, who practised for some years in Victoria, died recently in Vancouver. Born in Port Elgin, Ont., she graduated in medicine from Trinity College, Toronto, and took postgraduate work at universities in London, Edinburgh and Vienna. In 1899 she married H. M. Cleland, who died four years later. In 1906, Dr. Cleland traveled around the world and then took an appointment at Lady Kinnaird's Memorial Hospital in Lucknow, India. When her health failed her, she returned to Canada and settled in Victoria.

Dr. Henry Anstey Cookson, formerly Director of the Pathological Laboratories at the Royal Infirmary and at the Children's Hospital, Sunderland, Eng. died in the Toronto Western Hospital on May 15, 1949. Since his retirement last year, he had been in Canada on a visit to his two sons. After travelling to various places he intended to settle in Canada. In his short stay in Toronto, he became a friend of many laboratory workers and was always sure of a welcome when he visited them. Dr. Cookson is survived by his widow and two sons.

Dr. Azarie Cousineau, de Montréal, est dans un accident d'avion à S.-Michel des Saints le 9 octobre. Né à Pointe-Fortune, Que., il avait fait ses études au collège de Rigaud et à l'Université de Montréal, où il obtenait son doctorat en médecine en 1933. Il était attaché à l'hôpital de la Miséricorde et professeur à l'Université de Montréal depuis plusieurs années. Il était diplômé en obstétrique et gynécologie du Collège royal des médecins du Canada et membre du conseil médical de l'hôpital de la Miséricorde. Il laisse sa femme, une fille, ainsi que plusieurs frères, sœurs, neveux et nièces.

Dr. Paul Cymbalisty, staff physician at the Clearwater Sanatorium at The Pas, died suddenly on October 18. Born in the western Ukraine, he practised for 25 years at Lwiw in that country before coming to Canada. He is survived by his widow and two sons, one a medical student, the other a mechanical engineer at Innsbruck, Austria.

Dr. René Dandurand, de Montréal, est mort dans un accident d'avion à S.-Michel des Saints, Que., le 9 octobre. Il était né à Valleyfield en 1906. Après ses études classiques et médicales à l'Université de Montréal, il obtenait son doctorat en médecine de cette institution, en 1933.

En 1934, il était nommé interne senior à l'Hôtel-Dieu de Montréal. L'année suivante, il devenait chef interne. En 1936, il obtenait du gouvernement de la province une bourse d'études de deux ans à Paris, où il se spécialisa dans les maladies de l'arthritisme. En 1938, il alla également se perfectionner aux Etats-Unis, dans la même spécialité. Il était membre de l'American Rheumatism Association, de la Canadian Medical Association, de la Société médicale de Montréal. Il était président de l'Institut du rhumatisme de Montréal et, en 1946, il était élu vice-président de la Canadian Rheumatism Association. Il faisait aussi partie de la Canadian Arthritis and Rheumatism Society. Il laisse sa femme, et une fille de 7 ans.

Dr. McGillivray Stewart Fraser died on October 26 in the Winnipeg General Hospital aged 89. For the past thirty-four years he had resided in Winnipeg. In 1916 he became executive secretary of the provincial board of health and in the same year, when the late Dr. Armstrong was Provincial Secretary and Minister of Health, he organized a public health nursing group in Manitoba, the first of its kind in Canada. He served as medical director of public health nurses in Manitoba from 1916 to 1928 when the Department of Health and Public Welfare was organized, and continued with this department until his retirement in 1931. Born at White Lake, Ont., he graduated from Toronto Medical College and the University of Manitoba (M.D. 1890). Postgraduate work was carried on in Edinburgh. He practised in Brandon for twenty-five years before coming to Winnipeg. He was a senior member of the Canadian Medical Association. He is survived by three daughters and two grandchildren.

Dr. Arthur Saul Grover, died October 13, at the Jewish General Hospital, Montreal. He was in his 59th year. A native of Russia, Dr. Grover, who was vice-president of Grover Mills Limited, came to Montreal in 1912. He graduated in medicine from McGill University in 1923 and practised in Montreal until his death. He is survived by his wife, two daughters, a son, two sisters, and five brothers.

Dr. W. J. Henderson, died recently in Lindsay, Ont. Born in Little Britain, he was educated at Oakwood public school, Lindsay Collegiate Institute. Before

entering the University of Toronto medical school, he taught school for a time in Fingerboard. Upon graduation, he practised medicine in Cannington and came to Lindsay in 1927. He retired from practice in 1944, and had been ill since that time. Surviving are his widow and one brother.

Dr. John Herod, died suddenly on October 11 at his home in Toronto. He graduated in 1901 from Trinity Medical College and practised in Thorold until his retirement this year, when he came to Toronto. He took a keen interest in Masonry and was a past district grand master of the Masonic Order and past provincial pryor of the Knights Templar. He was a member of St. Catharines Lodge, Scottish Rite, and Rameses Temple. He also belonged to the Anglican Church. He is survived by his widow.

Dr. Leslie R. Hess, aged 72, died at his residence in Hamilton, Ont., on October 23. He had been the radiologist at St. Joseph's Hospital for 36 years, retiring in 1947. He was a fellow of the American College of Physicians and a former president of the Hamilton Academy of Medicine. Born in Hamilton he received his early education in Hamilton schools and Hamilton Collegiate. For a time he taught school in Beverly Township before attending the University of Toronto, where he took his medical degree, graduating as bachelor of medicine in 1903. On his return to Hamilton, he set up a practice, specializing in radiology. In 1912 he organized the first x-ray department at the General Hospital before going to St. Joseph's Hospital. He was a life member of Murton Lodge of Perfection, A. and A.S.R. He was married twice. His first wife died in 1934. Surviving are his widow, one son, one daughter and one sister.

Dr. Frederick W. W. Hipwell, aged 56, diabetes specialist, died shortly after suffering a heart attack at a football game in Toronto on October 29. He was a cousin and close personal friend of the late Sir Frederick Banting and took over Sir Frederick's office practice when Sir Frederick turned to full-time research.

Dr. Clarence Wood Johnston, aged 61, died in Elkhorn, Man. on October 13. Born in Newmarket, Ont., he came west with his parents to Morden when three years old. In 1914 he graduated from the Manitoba Medical college. During the first world war he was awarded the Military Cross while serving overseas as a captain with the 10th Field Ambulance from 1915 to 1919. Returning to Canada Dr. Johnson entered general practice at Elkhorn and served this community as family physician and surgeon for many years until failing health forced him to retire some time ago. A former chairman of the Elkhorn School Board and Mayor of Elkhorn, he also served as chairman of the Elkhorn stadium commission for many years. Besides his widow, he is survived by two daughters and one son.

Docteur Emile Legrand, de Montréal, est mort dans un accident d'avion à S.-Michel des Saints, Que. le 9 octobre. Né à Laprairie, il avait fait ses études classiques au séminaire de Sainte-Thérèse. A l'Université de Montréal il se révéla tout de suite comme un sujet d'élite et après avoir reçu son diplôme de médecine, il obtenait une bourse du gouvernement provincial pour aller se spécialiser en psychiatrie sous la direction des grands maitres de l'Université de Paris. Il aurait bénéficié des enseignements des Clérambault des Alajouine et obtint brillamment son diplôme de médecin légiste à Paris. Rentré au pays, il fut immédiatement attaché, à titre de spécialiste, à l'hôpital de Saint-Jean de Dieu, Montréal où il ne devait pas tarder à devenir chef de service. Aliéniste réputé, expert reconnu en médecine légale, demandé dans tous les grands procès pour expertise, le docteur Legrand était titulaire de la chaire de psychiatrie de l'Université de Montréal et professeur à l'Institut Pédagogique. Il dirigeait aussi l'hôpital des aliénés criminels à la prison commune. Membre de la Société de neurologie, de la Société médicale il était aussi chargé de la distribution des fonds du ministère fédéral de la Santé dans le domaine de la psychiatrie. Il était célibataire et était âgé de 50 ans.

Dr. Walter L. Lewis, died at his home in Lachine on October 28. He was in his 79th year. Born in St. Jean Chrysostome, Chateauguay county, he took his classical course at the Collège de Montreal and a course in philosophy at St. Mary's College before studying medicine at Laval University in Quebec, where he received his degree in medicine at 24. He moved to Lachine in 1909 after having practised in Argenteuil County for 14 years. In Lachine in 1912 in co-operation with Dr. J. A. Beaudoin, professor of public hygiene, University of Montreal, and the late Reverend F. Savaria, he founded St. Joseph Hospital. Survivors include his daughter and five sons.

Dr. J. S. McCullough, died suddenly in the Red Cross Hospital in New Liskeard on September 30, following a brief illness. He was in his early sixties. Born in Walters Falls, Ont., he was an honour graduate of Toronto University of the year 1912 and spent the next two years in Alberta. He came to New Liskeard in 1914. He was associated with the late Dr. Fisher for a number of years and then took over the practice. He was a charter member of the Kiwanis Club, as well as an active member of the Masonic Order, being a Past Master of the Temiskaming Lodge, and a Past First Principal of the Temiskaming Chapter. He is survived by his widow, one son and one daughter.

Dr. Ronald Hugh MacDonald of Saskatoon, died suddenly of a heart attack while attending a surgical convention in New Orleans on October 15.

"Ronnie" MacDonald was born in North Bedeque, P.E.I., 65 years ago. His pre-medical education was obtained at St. Dunstan's College, Charlottetown and in 1908 he obtained a medical degree from McGill being the Sutherland medallist of his class. In 1912 he decided to follow his close friend and class-mate at St. Dunstan's and McGill, the late Dr. Robert A. Donahoe who had settled in Rocanville, Saskatchewan, shortly after graduation. Incidentally it may be recorded that Bob Donahoe's record as an athlete at McGill has only once been equalled and never surpassed. Having won the all-round athlete's medal four years in succession from 1904 to 1908. Dr. MacDonald after a short time in rural Saskatchewan moved to Saskatoon and was acquiring a good surgical practice when he went overseas with the first contingent in the early fall of 1914. He returned to Canada in 1916 to recuperate from a bad leg wound received on duty at the front as medical officer. On his return to duty in France and Belgium deserved decorations and promotions came to him: a surgical specialist in No. 1 Canadian Casualty Clearing Station; Lientenant-Colonel and Commanding Officer of No. 4 Field Ambulance, then full Colonel and A.D.M.S. of 2nd Canadian Division; the D.S.O., Military Cross and Bar, and mentioned twice in dispatches, were the decorations received. It was stated in 1915-16 that he had been recommended for the V.C. Gradually his reputation as a surgeon was built up and he became well known in Western Canada as a chest surgeon. Fellowships in the American College of Surgeons and Royal College of Surgeons of Canada, and memberships in Canadian and American medical societies were conferred on him. Perhaps the honour he liked best was his membership in the comparatively small and select group of chest surgeons of the United States and Canada. His interest in fox and mink raising was more along the scientific Mendelian lines of breeding than the monetary return which came his way for the highly prized pelts produced at the MacDonald Ranch near Saskatoon. Dr. MacDonald was well and favourably known

in every surgical centre of importance in Canada and the United States. Scarcely a year went by without a visit to some clinic where chest surgery was being advanced. In July of this year he flew over to the British Isles. In between visits to hospitals and clinics he and his wife motored from London to Scotland to visit among other places the Vale of Glencoe and the former MacDonald estates of Glenaladale and Glenfinnan where Bonnie Prince Charlie's standard was first raised in 1745 in the nearly successful campaign to regain the throne of his ancestors. Dr. R. H. MacDonald's death is a great loss to the medical profession of Canada and in particular to Western Canada. The high regard in which he was held was shown when a senatorship was offered him in the later years of Prime Minister R. B. Bennett's leadership of the Federal Government of Canada. He refused the honour because he felt he could not attend in Ottawa at the sacrifice of the needs of his growing family and the time required for still further improving himself as a surgeon. He leaves a widow, two sons and a daughter.

Requiescat in pace, close and faithful friend.

E. J. MULLALLY

Dr. Cyril Hugh McGowan, aged 42, died October 6 at his home in North Bay from a heart attack. He was born in Scotland. He entered Queen's University at Kingston in 1924 and took his Bachelor of Arts degree in 1928, and his medical degree in 1934. He is survived by his widow, one son, two daughters and two brothers.

Dr. William Herbert McGuffin, aged 63, formerly proprietor of the Dr. W. H. McGuffin Radium and X-Ray Institute in Calgary, died October 25 in London, Ont., He had been in failing health for several years, and his illness was directly attributable to the effects of his diagnostic and therapeutic x-ray work.

Born in London, Ont., he went to school there, and graduated, in 1910, from the University of Western Ontario Medical College, London. He came to Calgary in 1910, opened the Institute in 1911, and carried on a general practice in addition to x-ray and radiology, until 1918. Since 1918 his practice had been confined exclusively to radiology. He served as consulting radiologist for M.D. 13 during both wars, and was a member of the Alberta United Services Institute. He was radiologist to both the Holy Cross and the General Hospitals. He was a Fellow of the American College of Radiology, Diplomate of the American Board of Radiology, and a Fellow of the United Empire Society. He was also a Fellow, Faculty of Radiology, London, England. He had served as president of the Radiological Society of North America, the Canadian Radiological Society, and the Canadian Association of Radiologists. In 1946 he was made a Doctor of Laws at the University of Western Ontario. With the late Dr. John McEachern, Dr. McGuffin organized the Alberta Cancer Society, later the provincial branch of the Canadian Cancer Society, of which he had been made an honorary life member earlier this year. He had been an active member of the Canadian Medical Association. He was also active in the Southern Alberta section, alumni association, University of Western Ontario, and was president of the alumni group at the time of his death. He was a member of Wesley United Church, the Canadian Club, Knights of the Round Table, the Kinsmen Club, the Alberta chapter, Royal Arch Masons, and the Calgary Golf and Country Club. He is survived by his wife, two daughters, one grandson and two brothers.

Dr. J. B. McKay, aged 64, died, in Edmonton, Alberta, September 27, 1949. He was born in Helemsburg, Scotland and graduated at the very young age of twenty-two years. He practised for a short period near Liverpool and then travelled widely for a year and a half as a ship's surgeon. He opened a practice in Kitscoty, Alberta, in 1912. At the outbreak of war he became provoked at the slow recruiting of medical officers and returned to England to join the Imperial Army. He saw service in France and in 1918 returned to Kitscoty. In 1924 he moved to Provost and practised until he was forced to retire for a two year period with tuberculosis. He then returned to practice in Edmonton. He confined his practice to internal medicine and for years was in charge of a tuberculosis ward at the Royal Alexandra Hospital. He was also a clinical instructor in medicine at the University of Alberta and will be missed for his dry wit, keen and inquiring mind. In addition to local societies he was a Mason, a member of the British Medical and American Heart Associations. He is survived by his wife and son who is a recent graduate in medicine.

Dr. Roy C. McLaughlin, aged 56, died recently in Hollywood Presbyterian Hospital, Los Angeles, Calif. He graduated from the Manitoba College of Pharmacy in 1913 and from the Manitoba Medical College in 1917. After service overseas, he practised in Saskatchewan. For the past 20 years he has been practising in Los Angeles and resided in Beverley Hills, Calif. He is survived by his widow, a daughter, his mother, two brothers and three sisters.

Dr. Charles William Sanders of Victoria, died on October 1 at St. Joseph's Hospital at the age of 71. A graduate of McGill University, he spent four years studying in Europe, taking a degree in Edinburgh and London. He spent some time in India and Africa in research work before coming to Canada to practise in Red Deer, Alta. He served with the Canadian Army Medical Corps overseas during the First World War and had been ship's surgeon on C.P.R. Empress ships sailing to the Orient. Shortly before the occupation of Hongkong by the Japanese, he was superintendent of Matilda Hospital there. His varied career included relieving for Dr. J. L. Murray Anderson, school doctor, while the latter was overseas and serving as surgeon aboard the cableship *Restorer*, when it went to Guam recently. Born in Kemptville, Ont., he resided in Victoria for 22 years. Besides his widow he leaves a son, two grandchildren, two brothers and two sisters.

Dr. Omer H. Singleton, aged 62, died suddenly in Swift Current, Sask., on October 9. Born in eastern Ontario, he attended Queen's Medical College at Kingston, and was a member of the medical corps in the First World War. On his return to Canada he practised for some years in Saskatchewan. He had practised in Kelliher, Sask., for about six years, prior to leaving for Lipton in October, 1948. He was a member of the Masonic lodge. Predeceased by his wife several years ago, he is survived by one daughter and three sons.

Dr. Reginald Third, aged 52, died October 12 in the Kingston General Hospital. Born in Kingston, he obtained his Bachelor of Arts degree from Queen's University in 1919 and his M.D.C.M. in 1921. He was a member of Queen's University's Faculty of Medicine for some years. He is survived by his widow and his mother.

Dr. Jack Wright of Vancouver, died in Shaughnessy Military Hospital on September 19. He was 46. He was taking treatments for a leg ailment and is understood to have suffered a heart attack. Born in Trail, he was educated at Gonzaga College, Washington, and received his medical degree from McGill University. He was best known as a spectacular tennis star and was three times Canadian champion. He was also well-known in Vancouver medical circles, first Vancouver General Hospital, as assistant superintendent and later in private practice. He served in the Medical Corps with distinction overseas and was discharged as a lieutenant-colonel. He is survived by his widow and one daughter.

NEWS ITEMS

Alberta

Dr. J. W. Duggan, a graduate of the University of Alberta is taking postgraduate work in ophthalmology at the University of Tulane. Dr. Duggan recently "came North" to marry Miss Lorraine Smith of Edmonton, the couple returned to New Orleans where Dr. Duggan will continue his studies.

Dr. A. H. Mercer of Lethbridge received his Certification from the American Board of Pathology in Clinical Pathology following recent examinations by that Board. Dr. Mercer also holds the Diploma of Clinical Pathology from the University of London, England.

Dr. C. P. C. Clarke formerly of the Colonel Belcher hospital has taken up private practice in Calgary.

It has been noted that an ever-increasing number of medical men of the province have taken up the hobby of art and many fine oil paintings are being hung privately and publicly. The endless number of beautiful scenes in the province with the Rockies in its Western sections is a great stimulus to those seeking leisure. The School of Fine Arts of the University is playing a great part both at Banff and Jasper, in this respect. To this School come pupils from most countries each summer.

A goodly number of medical men attended the course for the Royal College Fellowship and Certification in Toronto and the results of their efforts should be noted in the next issue.

Dr. H. E. Duggan of Edmonton completed a course in Medical Aspects of Nuclear Energy at the University of California.

W. CARLETON WHITESIDE

British Columbia

The Jubilee Hospital at Vernon is to have a free diagnostic and consultative Cancer Clinic, which opens on October 29, 1949. Dr. Max Evans of the British Columbia Cancer Institute at Vancouver will be the physician in charge. Any resident of Vernon or the North Okanagan will be able to use this service on recommendation from his or her own physician. This will save a great deal of expense and inconvenience due to travelling.

Nakusp, B.C. is to have an x-ray unit in its Arrow Lakes Hospital. This is due to a bequest of $3,000.00 left by the late Capt. James Fitzsimmons, former M.L.A. for Kaslo-Slocan. Capt. Fitzsimmons, a native of Prince Edward Island, also left bequests to hospitals at Revelstoke, New Denver and Kaslo.

A new 40-bed hospital will be built shortly at Creston, in addition to the present Creston Valley Hospital. It will have all modern hospital services, maternity wing, operating theatres, isolation department and so on.

An important conference was held recently in Vancouver, and for the first time in Canada—the Western Conference of Prepaid Medical Service Plans. Speakers from California and Utah, and representatives from other Western States and Hawaii met representatives from Western Canada's three provinces and discussed the question of voluntary plans and the possibility of their extension. Medical Services Association (M.S.A.), which has been in operation for eight years, is considering a pilot plan of community enrolment, and is exploring other avenues of extension of its services.

In a record list of candidates passing the examinations of the B.C. Registered Nurses' Association, first place was taken by Sister Anne Antoinette, a student of St. Paul's Hospital Nursing School. She heads a roll of 182 successful candidates.

The latest reports on vital statistics from the City Hall in Vancouver show that city to have the lowest infant mortality rate in Canada, with 249 per 1,000 live births. Prematurity was accountable for 84 deaths, or 8.65 per 1,000, as compared with 17 per 1,000 twenty years ago.

Recent prosecutions of those who have not paid their hospital insurance dues have been very effective in bringing in those who have been putting it off. All 1949 dues must be paid before 1950 dues can be accepted.

St. Paul's Hospital is building a new three storey addition to its main building. This will be used chiefly for administrative offices.

Dr. F. C. Bell, who was medical superintendent of Shaughnessy Hospital, has resigned his post recently. Dr. Bell had been medical superintendent of the Vancouver General Hospital for many years, but went to Shaughnessy in 1939. He had a distinguished military career from 1914 to 1916, being wounded at Ypres.

The University of British Columbia has officially opened its new Home Economics Building. The department of Home Economics has been in existence in the University since 1943 and has turned out 140 graduates, who are to be found as teachers, dietitians, etc., all over Canada. The construction of the new building was greatly aided by a $75,000.00 bequest from the late Jonathan Rogers, a well-known Vancouver pioneer, and a gift of $20,000.00 from the B.C. Parent-Teacher Association. Miss Charlotte Black is the head of the department.

St. Joseph's Hospital, Victoria is building a new wing which will give the hospital 128 extra beds. A federal grant of nearly $100,000.00 will be made towards this new addition. Bulkley Valley Hospital at Smithers has also received a grant of $6,000.00 which will give it six extra beds. Provincial grants of similar amounts are also being made.

The new Tuberculosis Institute, situated in Vancouver, came in for very high praise recently from Dr. J. Arthur Myers, Professor of Medicine at the University of Minnesota, and specialist in chest diseases. Dr. Myers considered the unit to be "the best of its type" in North America. This building was erected by the money received from sale of Christmas seals by the B.C. Tuberculosis Society, and this led Dr. Myers to remark that "nowhere to my knowledge, is this seal money used to such excellent advantage". He was amazed, too, at the strides made in the control of T.B. among cattle by veterinarians in B.C.

Dr. Myers was in Vancouver as chief speaker at the annual meeting of the Pacific Northwest Chapter of the American Trudeau Society.

J. H. MACDERMOT

Manitoba

W. W. Hawkins, formerly Assistant Professor of the Department of Biochemistry of the University of Saskatchewan, has been appointed Assistant Professor in the Department of Physiology and Medical Research of the University of Manitoba.

Dr. Julian P. Adamson has received a Fellowship from the Canadian Life Insurance Officers Association, to study some aspects of hypertension. He will hold the Fellowship working in the Department of Medicine and the Department of Physiology and Medical Research of the University of Manitoba.

The maternity pavilion of the Winnipeg General Hospital is nearing completion. It is expected that with the beginning of the new year patients will be admitted.

Final pieces of equipment for Manitoba Red Cross free blood transfusion service are being installed at the new Red Cross centre in Winnipeg. Dr. Cecil Harris, provincial medical director states that standardization of techniques and equipment will enable one area to aid another in the event of major disaster calling for large supplies of blood and plasma. A campaign to enlist volunteer blood donors will be held in November.

ROSS MITCHELL

New Brunswick

Dr. A. F. Chaisson, district medical officer, for Victoria, Carleton and York Counties, has begun study at Toronto University, school of hygiene to obtain his D.P.H. In his absence Dr. J. R. Allanach will assume Dr. Chaisson's duties.

Dr. J. W. Dobson and Dr. K. W. MacKenzie, of Moncton are attending Memorial Hospital for Cancer and allied diseases at New York on scholarships provided by the N.B. Division of the Canadian Cancer Society. The plan of subsidizing study of cancer by chosen clinicians of the Province of New Brunswick has proved of much value already, and the money spent on this plan by the Cancer Society has sharpened the awareness of doctors in their diagnosis of cancer in all parts of our province; so that the people who supply the funds for the society reap directly the benefits of the educational scheme sponsored by their contribution.

On October 20, the Saint John Medical Society was privileged to hear Dr. H. R. Ripley, Radiologist of the Moncton City Hospital, describe his recent tour in Britain. Dr. Ripley described the radiation techniques at Manchester and Edinburgh, with special details of the treatment of carcinoma of the breast and cervix uteri.

The American College of Surgeons has conferred fellowships on Dr. John A. Finley, and Dr. F. D. Wanamaker of Saint John, N.B.

Dr. Arnold Farrell, Radiologist of the Victoria General Hospital, at Fredericton, has qualified for the certificate in Radiology at the recent meeting of the American Board of Radiology in Cincinnati.

Dr. Geo. M. White of Saint John is doing special studies in cancer of the female pelvis at University Hospital, Ann Arbor, Michigan, on a scholarship grant from the N.B. Division of the Canadian Cancer Society.

Mr. Dale Trout of the General Electric Co. was the guest speaker at a special meeting of the radiologists of New Brunswick at the Kings County Memorial Hospital, Sussex, N.B. in October.

A. S. KIRKLAND

Nova Scotia

The big news item of October in Nova Scotia for the Medical Profession was the Dalhousie Refresher Course. For twenty-six years members of the profession have been gathering at the Medical School each autumn for a few days of lectures, clinics, and demonstrations. Instruction is given by regular members of the Faculty and outstanding men from outside centres. The latter group this year consisted of Sir James R. Learmonth, Regius Professor of Surgery, Edinburgh, and Surgeon in Scotland to His Majesty, The King; Dr. Willard O. Thompson, Professor of Medicine, University of Illinois; Dr. John L. Fromer, Director Department of Dermatology and Allergy, Lahey Clinic, Boston; Dr. Harold R. Griffiths, Associate Professor of Anæsthesia, McGill University; Dr. D. W. G. Murray, Senior Demonstrator of Surgery and Clinical Surgery, University of Toronto; and Dr. A. W. Riggio, Medical Director, United States Public Health Service.

One hundred and sixty-seven physicians registered.

A feature of the Course was the first Dr. John Stewart Memorial Lecture, given by Sir James Learmonth. This lecture, sponsored by the Provincial Medical Board of Nova Scotia was designed to commemorate the life and work of Dr. John Stewart of Halifax, for many years President of the Provincial Medical Board and Dean of the Faculty of Medicine at Dalhousie University. Dr. Stewart was universally known for his association with Joseph Lister as his house surgeon when he came from Edinburgh to London, and as one of the great disciples to Canada of Antiseptic Surgery. In 1915 when 67 years of age he went overseas in command of the Dalhousie Hospital Unit. He delivered the first Listerian Oration to the Canadian Medical Association.

The Refresher Course this year was regarded as an unqualified success, and the members of the Committee on Arrangements deserve the highest commendation. It was made up of the following, all of Halifax: Dr. A. L. Murphy, Chairman, Dr. T. E. Kirk, Dr. B. F. Miller, Dr. C. M. Bethune, Dr. E. F. Ross, Dr. J. W. Reid, Dr. T. M. Sieniewicz, Dr. D. M. MacRae, Dr. R. O. Jones and Dr. C. W. Holland.

H. L. SCAMMELL

Ontario

Federal health grants to aid mental health services will be made to Toronto Psychiatric Hospital, Kingston General Hospital, Ontario Hospital at St. Thomas and the Department of Psychiatry at Queen's University. Federal funds have been allotted to provide four additional psychiatric social workers for Toronto Psychiatric Hospital. Visual training equipment also will be provided for students doing postgraduate work. Electroshock equipment will be supplied for both Queen's University and the Kingston General Hospital, and Queen's will obtain visual aid equipment.

In mediæval times scholars wandered from one university to another in Europe sitting under distinguished professors. Today the professors visit and lecture. Dr. Gordon Murray last summer gave the Moynihan Lecture, Royal College of Surgeons, London; the Simpson-Smith Memorial Lecture, Hospital for Sick Children, Great Ormond Street, London. He also lectured at London Hospital Medical School, St. Mary's Hospital Medical School and University College Hospital Medical School, London and at University of Leeds Medical School and Academy of Medicine, Leeds and at University of Paris, France.

Dr. C. H. Best has gone to Africa for about three months to lecture at several universities and to continue research into dietary deficiencies with their effects on the liver.

The following appointments in the Faculty of Medicine, University of Toronto have been announced: Dr. R. E. Haist to be Professor of Physiology, he has been with the Department since 1941; Dr. Frieda Fraser to be Professor of Hygiene and Preventive Medicine, she has been with the department since 1937; Drs. W. H. Brown, H. H. Hyland and J. L. McDonald to be Associate Professors and Drs. C. L. Ash, E. S. Coranson and F. G. Kergin to be Assistant Professors.

The Ambulatory Fracture Convention of the Orthopædic Surgeons held a four day convention in Toronto under the presidency of Dr. Curtis Lee Hall, Washington, D.C. Delegates came from all parts of United States and South America. Part of the program was a televised operation at Sunnybrook Hospital. This is only the second time an operation has been televised in Canada, the first was in June in Saskatoon.

The Toronto Academy of Medicine is having a campaign to raise $200,000 to build an Osler Memorial Hall which is to consist of an auditorium able to seat 375 people and a library stackroom to house one of

"Imprisoned in every fat man,
a thin one
is wildly signaling to be let out."

C. C. Palinurus, quoted in Bull. New York Acad. Med. 24:2 (Feb.) 1948.

Overeating imprisons the "thin one", and he can signal till doomsday, but he will never get out unless the "fat man" stops overeating.

'Dexedrine' Sulfate curbs appetite, makes it easy for the overweight patient to stop overeating and thus reduces weight safely without the use (and risk) of such potentially dangerous drugs as thyroid.

Dexedrine Sulfate Tablets & Elixir

The most effective drug for control of appetite in weight reduction

Smith Kline & French
Inter-American Corporation
Montreal 1

'Dexedrine' T. M. Reg. Can. Pat. Off. for dextro-amphetamine sulfate, S.K.F.

the finest medical libraries in Canada. The Academy is making no public appeal because the committee feels that the 1,646 academy fellows can and will build their own memorial to the great medical humanist.

LILLIAN A. CHASE

Sir John Parkinson, Physician-in-Chief, National Heart Hospital, London, England, acted as Visiting Chief-in-Medicine at the Vancouver General Hospital the first week in October, spent a few days in Winnipeg, and a week in Toronto before going on to Montreal. While in Toronto, Sir John visited Sunnybrook Hospital, Toronto General Hospital, Toronto Western Hospital and the Hospital for Sick Children and gave freely of his advice in difficult cases. He had not been in Canada since 1939. Practically all of our local cardiologists have studied under him at one time or another and he is looked upon as being the successor to Sir James MacKenzie.

The corner stone for the new $1,500,000 wing of the Toronto East General and Orthopædic Hospital to be known as the Joseph H. Harris Pavilion, was laid on October 29. The corner stone was laid by Mr. Harris who is the Federal member for Danforth. Mr. Harris has been chairman of the Hospital Board since 1926. Canon H. J. Cody dedicated the wing. The new wing provides new patient accommodation, operating room and nurseries. The equipment includes an emergency lighting unit.

Lord Webb Johnston, President of the Royal College of Surgeons received an Honorary LL.D. degree at a special convocation on October 3, at the University of Toronto.

Ontario's facilities for the care of the mentally ill are to be expanded over a five year period at a cost of between $30,000,000 and $35,000,000. This will include the building of new hospitals and the enlargement of others. Two of the new hospitals will be in Northern Ontario and will have a bed capacity of 500 each. It is expected that the Toronto-Hamilton area will have an increased bed capacity of 2,000 and the Kingston-Brockville area 1,000 beds. Ontario at present has 14 mental hospitals and one psychiatric hospital; these accommodate nearly 17,000 patients.

Sir James Learmonth, K.C.V.O., F.R.C.S.(Edin.) of the Department of Surgery, University of Edinburgh, delivered the Balfour Lecture for 1949 at the University of Toronto. His subject was "Embolism and Thrombosis of the Aortic Bifurcation". Later, after a dinner at the York Club he was the speaker at the Surgical Stated Meeting at the Academy of Medicine. He discussed there his experience in the surgery of the spleen. Both addresses were given to large, enthusiastic audiences. His criteria for operation on the spleen will be of great value to those who had the privilege of hearing him.

Under the direction of D. L. N. Silverthorne and by funds from health grants, the merits of various types of treatment with chemicals and antibiotics for the control of bacterial meningitis will be investigated at the Hospital for Sick Children, Toronto; 150 to 200 cases will be investigated. A complete physical and psychological examination will be made to determine the amount of recovery.

The Academy of Medicine, Toronto, has had an active session during October. On October 4 the new President, Dr. A. R. Hagerman gave his inaugural address on "'Demands for Service" at a dinner at the Royal York Hotel. A replica of the Presidential Badge was presented to the Past President, Dr. W. A. Burr. Sir Jack Drummond, Director of Research, Boots Pure Drug Company, England, spoke on "Advances in Nutrition in Great Britain" at a dinner held at the King Edward Hotel by the Section of Industrial Medicine on October 13. Numerous section meetings were held at the Academy. The only marring notes were the lack of accommodation in the Academy Building itself and the poor acoustics in the rented auditorium. The Academy hopes to overcome these difficulties by their building campaign which commences in November. It is hoped a new auditorium and addition to the library and stockroom will result from this campaign.

The Department of Surgery, University of Toronto has arranged to hold clinical sessions at the various Toronto hospitals this fall and spring, and the Section of Surgery, Academy of Medicine is arranging evening meetings to correspond with the dates chosen.

A new wing of St. Joseph's Hospital, Toronto, was opened on Thursday, October 27. It will be known as the Morrow Wing, named after Mr. E. K. Morrow, a present and an original member of the hospital board. His Eminence James Cardinal McGuigan cut the ribbon and dedicated the wing. This wing raises the bed capacity from 350 to 600. In the new wing there is a modern nursery in which ultra-violet light is used against infection. This is but one of the many features of this addition.

Dr. Allen A. Small has opened an office at 329 Bloor St. West, Toronto, and will specialize in diseases of the skin.

Dr. D'Arcy K. MacDonald has opened an office in the Hendry Building, 262 St. Clair Ave. West., Toronto, and will practise ophthalmology.

On October 24 an informal luncheon was held at the Toronto East General Hospital to welcome Dr. S. F. Penny, their new pathologist. The guests included the pathologists from the other Toronto hospitals and the Banting Institute, also the President of the Academy of Medicine. Dr. Penny is not new to Toronto, as, before serving in the last war, he was pathologist with the Provincial Board of Health of Ontario. He returns to Toronto from a similar position with the Federal Government.

From Ontario's share in the more than $5,000,000 provided annually by the Federal Government for the public health services in Canada, $47,000 will be spent for new scientific equipment for Ontario's Division of Industrial Hygiene. About three quarters of this grant will be used to buy a travelling x-ray unit for regular examinations in industries where workers are exposed to silica dust. The remainder will be spent in investigations into health conditions in factories.

The Section of General Practice of the Ontario Medical Association held a postgraduate course on Obstetrics and Gynæcology in the Auditorium, Sunnybrook Hospital, Toronto, on November 21 to 24.

NOBLE SHARPE

Quebec

Le docteur Chaput a été nommé membre associé de la National Gastro-enterological Association, section américaine à la réunion du mois de septembre.

Le docteur Chevalier Jackson a donné récemment une conférence à l'hôpital Sacré-Cœur de Cartierville sur l'importance clinique des bronches segmentaires et des segments broncho-pulmonaires.

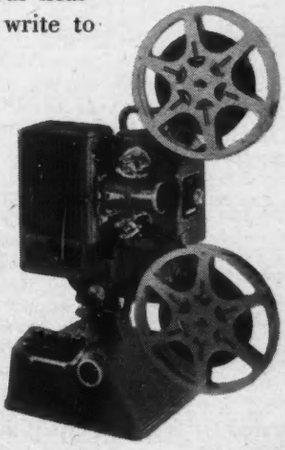
Le professeur Charles Debray de Paris a passé quelques semaines à l'hôpital St-Luc de Montréal où il a présenté une série de cours et de leçons cliniques intéressant la pathologie digestive.

This sequence of 16-millimeter frames demonstrates progress of rehabilitation in a case of paraplegia. Note how the patient is able to assume sitting posture in chair from recumbent position, without assistance.

Picture the patient's progress

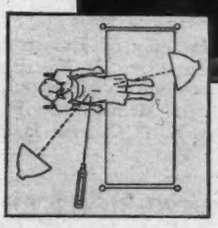
. . . with photograph . . . after photograph

To ensure proper projection of 16-millimeter motion pictures—black-and-white and color—many physicians prefer Kodascope Sixteen-20 Projector. Threading is easy. . . . quick—adjustments are few . . . positive—operation is smooth . . . "push button." Conversion from average projection conditions to those for long "throw" in spacious auditoriums, or to those for short "throw" in small rooms, is simple. Optics are superb . . . the lenses are *Lumenized* to give more brilliant images of better contrast and color purity. For further information, see your nearest photographic dealer . . . or write to Canadian Kodak Co., Limited, Toronto 9, Ontario.



Major Kodak products for the medical profession

X-ray films; x-ray intensifying screens; x-ray processing chemicals; electrocardiographic papers and film; cameras—still- and motion-picture; projectors—still- and motion-picture; enlargers and printers; photographic films—color and black-and-white (including infrared); photographic papers; photographic chemicals; synthetic organic chemicals; Recordak products.



Light nearest camera affords general illumination. Second light, 120° to camera axis, provides "pickup" illumination to outline subject.

Serving medical progress through Photography and Radiography

Kodak
TRADE-MARK

Le docteur Charles Vézina, doyen de la faculté de médecine de l'université Laval de Québec a été élu président de l'Association des facultés de médecine du Canada.

Le docteur J. R. Boutin directeur médical de l'hôpital Nôtre-Dame de Montréal a été admis comme membre du collège américain des administrateurs d'hôpitaux à la quinzième réunion qui a été tenue à Cleveland.

Le docteur Jean-Louis Léger membre du service de Radiologie de l'hôpital Nôtre-Dame a pris part au récent congrès de Neuro-radiologie de Rotterdam.

Le docteur Origène Dufresne de l'Institut du Radium s'est rendu à San-Francisco pour assister à la Semaine du Cancer.

Les Associés du Collège Royal en pédiatrie dans la province de Québec se sont groupés en corporation sur l'invitation du Dr Paul Letondal qui a été élu président. Le docteur Letondal revient d'un voyage en France où il était délégué de la faculté de médecine de l'université de Montréal, aux congrès de pédiatrie.

YVES PRÉVOST

Saskatchewan

The University of Saskatchewan Medical College has been completed to the point where it can be taken over by the faculties and active teaching is now in practice in the building.

The University hospital construction is going ahead well on wings "F" and "G". It is anticipated that one of the first services to be established will be the Blood Bank in co-operation with the Canadian Red Cross.

The St. Paul's Hospital in Saskatoon is enlarging its bed capacity. A grant by the Federal and Provincial governments has been made. The Saskatoon City Hospital is planning an extension to hospital and enlargement of the Nurses' Home for which a money by-law is being voted upon this month.

During the week October 3 to 8, the Western Canada Institute for Hospital Administrators and Trustees held its fourth institute in Regina. It was very well attended and the problems under discussion were primarily those of hospital administration. It became evident to the observer that the Institute was a little out of balance through the absence of members of the hospital medical staff who are not directly concerned with administration. The welfare of the patient will approach its zenith when the smooth operation of the hospital develops to its greatest extent by the three bodies—governing, administering and professional staffing, all working together with a full knowledge of each other's hopes and difficulties. The Hospital administrators and trustees are to be congratulated on the success of this Institute.

Dr. J. S. McGillivray, formerly of Prince Albert, is now practising at Lashburn; Dr. J. W. Pennington formerly of Regina, is practising at Milestone. Dr. S. A. Simon is associated with Dr. M. Rubin at Foam Lake and Dr. R. D. Smylie, formerly of Central Butte is now located at Imperial.

Dr. W. Auerbach has returned to the province and is practising at Arborfield and Dr. C. E. Lelaidier has also returned to the province to practice at Antler.

Dr. R. J. Weil, formerly of Weyburn, is attending a postgraduate course at the Winter V.A. Hospital, Topeka, Kansas. Dr. E. M. Brown of Saskatoon has left for New York for a year of postgraduate study.

G. GORDON FERGUSON

General

We note that a postgraduate course in Neurosurgery will be held at the National Hospital, Queen Square, London, Eng., next spring. The course is to consist of a series of lectures on neurosurgical, neurological and allied subjects, with clinical demonstrations and attendance at operations by arrangement. Amongst the guest lecturers we note the names of Professor Sir James Learmonth, Professor Alajouanine, Professor J. Lhermitte and Dr. Arne Torkildsen. For further details see the notice on page 35.

The University of Western Ontario Osler Society. This is one of the very few undergraduate Osler Societies in Canada which issues a bulletin. We acknowledge with pleasure receipt of the 4th number of their first volume, and note the activity of their Society. With such a vigorous youth this Society gives high promise of maintaining the standards of their great patron. All good fortune be with them!

The British Empire Cancer Campaign has established two Fellowships per annum for Canadians, of an approximate value of £1,000 per annum each. Travelling expenses to and from England will be borne by the National Cancer Institute of Canada. The Fellowships are open to those engaged in the clinical and allied sciences and those doing fundamental research. Apply to the National Cancer Institute of Canada, 280 Bloor Street West, Toronto 5, Ont., no later than December 15, 1949.

An appeal has been made by the *Arztliche Praxis* (a German weekly for the general practitioner) to Dr. Brock Chisholm, Director General of the World Health Organization, for help in dealing with the surplus of physicians in the Western Germany zones. It is pointed out in an open letter to Dr. Chisholm that the emigration of these doctors is prevented by the lack of a peace treaty between the allies and Germany. It is suggested that efforts should be made through the World Health Organization to have teams of German physicians sent to countries where there is a lack of such workers.

Four junior fellowships for postgraduate study in psychiatry at the University of Western Ontario, London, will be financed from the federal health grants. Federal funds have also been earmarked to meet the salary of a part-time clinical instructor in psychiatry and to buy an electroencephalograph for the neurosurgical and neuropathological unit of Victoria Hospital. The clinical instructor provided for in the federal grant will supervise and instruct the students, and the electroencephalograph or "brain wave" machine will be used in their courses. Entire cost of the project in the current fiscal year is estimated at $11,900 and will be charged to Ontario's share in the federal grant for developing mental health services.

Medical Research Fellowships. The Medical Fellowship Board of the National Research Council is now accepting applications for postdoctoral research fellowships for 1950-1951 under the following programs:

National Research Fellowships in the Medical Sciences, supported by grants from the Rockefeller Foundation, provide opportunities for experience in research in all branches of medical science. They are open to citizens of the United States or of Canada who hold the M.D. or Ph.D. degree, and who, as a rule, are not more than thirty years of age.

Welch Fellowships in Internal Medicine, also supported by the Rockefeller Foundation, provide a prolonged period of advanced training to persons of proved research ability. They are open to physicians under forty years of age who are citizens of the United States.

Fellowships in Poliomyelitis and related fields are supported by the National Foundation for Infantile Paralysis, Inc. They provide training and experience

CRYSTALLINE PENICILLIN *G*

It has been widely established that Penicillin *G* is a highly effective therapeutic agent. The crystalline form of Penicillin *G* prepared and supplied by the Connaught Medical Research Laboratories is highly purified. Because of this high degree of purity, pain on injection is seldom reported and local reactions are reduced to a minimum. Crystalline Penicillin *G* is heat-stable, and in the dried form can be safely stored at room temperature for at least three years.

PHOTOMICROGRAPH
OF PENICILLIN CRYSTALS

CRYSTALLINE PENICILLIN G IN VIALS

Highly purified Crystalline Potassium Penicillin *G* is supplied by the Laboratories in sealed rubber-stoppered vials of 100,000, 200,000, 300,000, 500,000 and 1,000,000 International Units. No refrigeration is required.

CRYSTALLINE PROCAINE PENICILLIN G IN OIL

A prolonged-acting penicillin in peanut oil with 2% aluminium monostearate is available in 1-cc. cartridges for use with B-D* disposable plastic syringes, or as replacements with B-D* metal cartridge syringes. Each 1-cc. cartridge contains 300,000 International Units of Crystalline Procaine Penicillin *G* in Oil. The product is also supplied in 10-cc. vials each containing 3,000,000 International Units.

No refrigeration or pre-warming is required.

* T. M. Reg. Becton, Dickinson & Co.

CRYSTALLINE PENICILLIN G IN TABLETS FOR ORAL USE

Buffered tablets of Crystalline Potassium Penicillin *G* are distributed by the Laboratories in tubes of 12. Two strengths are supplied, 50,000 and 100,000 International Units per tablet. No refrigeration is required.

CONNAUGHT MEDICAL RESEARCH LABORATORIES
University of Toronto Toronto 4, Canada

in the study of virus diseases, and in any field contributing to progress in orthopædic surgery. Candidates for Fellowships in virus diseases must hold the M.D. or the Ph.D. degree. Fellowships in orthopædic surgery are open only to graduates in medicine who have completed one or more years of hospital work in clinical surgery. Applicants must be citizens of the United States. These fellowships are intended for individuals who, as a rule, are not more than thirty years old.

Senior Fellowships in Poliomyelitis and related fields are also available under grants from the National Foundation for Infantile Paralysis, Inc. They provide, for persons of proved research ability, opportunity for advanced training and research in the fields of clinical neurology, epidemiology, orthopædic surgery, pædiatrics, and virus diseases. Applicants must be United States citizens under forty years of age. Senior Fellowships in the field of virus diseases are open to physicians and to holders of the doctorate in the basic sciences; applicants in the four other fields must be graduates in medicine.

Fellowships in Anæsthesiology have been made available by a grant from the American Society of Anæsthesiologists, Inc. They are designed to relate the disciplines of anatomy, biochemistry, pharmacology, physics, and physiology to problems of clinical anæsthesia. Applicants must have the M.D. degree and at least one year of hospital experience.

Fellows will be appointed at a meeting of the Medical Fellowship Board early in March, 1950. Applications for consideration at this meeting must be filed before December 1, 1949. Appointment may begin at any date determined by the Board. For further information about these fellowships, address the Secretary of the Medical Fellowship Board, National Research Council, 2101 Constitution Avenue, N.W., Washington 25, D.C.

National Tuberculosis Association. The 46th annual meeting of the National Tuberculosis Association will be held April 24 to 28, 1950, at the Hotel Statler, Washington, D.C. Meeting concurrently with the N.T.A. will be its Medical Section, the American Trudeau Society, and the National Conference of Tuberculosis Secretaries, an organization of public health workers. Further information may be obtained by writing the National Tuberculosis Association, 1790 Broadway, New York 19, N.Y., U.S.A.

American College of Surgeons. Nine hundred and twenty-one initiates were received into fellowship and eight honorary fellowships were conferred by the American College of Surgeons at the Convocation on Friday evening, October 21, which was the closing session of the thirty-fifth annual Clinical Congress in Chicago. The fellowships were conferred by Dr. Frederick A. Coller of Ann Arbor, President of the College. The Fellowship Address was delivered by Lord Webb-Johnson of London, England, Immediate Past President of the Royal College of Surgeons of England and an Honorary Fellow of the American College. His subject was "Science in Surgery—Stop, and Look, and Listen".

The following initiates from Canada were received into Fellowship:

Alberta.—John S. Gardner, Calgary; R. Graham Huckell, Edmonton; Harold L. Richard, Edmonton.

British Columbia.—Frederick S. Hobbs, Vancouver; Robert G. Langston, Vancouver; Ross Robertson, Vancouver.

Manitoba.—Patrick H. McNulty, Winnipeg.

New Brunswick.—Robert B. Eaton, Sackville; John Armand Finley, Saint John; Frank D. Wanamaker, Saint John.

Nova Scotia.—Basil K. Coady, Halifax; James S. Hammerling, Halifax; J. Alexander Webster, Shelburne.

Ontario.—Charles D. Keeley, Chatham; William T. Mustard, Toronto; Donald P. Robertson, Sarnia; George R. Walker, Sudbury.

Quebec.—Eugene F. Balangero, Montreal; Edmond Bourgault, Amos; Jean Paul Bourque, Montreal; Wilfred M. Caron, Quebec City; Ray N. Lawson, Montreal; Jean Paul Legault, Montreal; James L. Macarthur, Montreal; John T. MacLean, Montreal; Oscar Nutik, Westmount; John R. Smith, Montreal; James Turcot, Quebec.

Saskatchewan.—Clarence J. Houston, Yorkton.

Hospital for Sick Children Alumni Meet. A function unique in the history of the Hospital for Sick Children occurred in Toronto, November 4 and 5, when over one hundred former interns and residents assembled at the hospital. Pædiatricians from points as remote as Vancouver and Halifax, from Boston, Ithaca and Troy, and from most communities between, turned up on the invitation of Dr. Alan Brown to refresh their knowledge and revisit the scene of their training.

It was a pleasant admixture of the medical generations, from the legendary figures of forty years ago to the current men in white at the hospital. The honoured guest who delivered the principal address was Dr. Alton Goldbloom, Professor of Pædiatrics at McGill University.

It was inevitable that the gathering should give rise to a continuing organization, and to effect this the following officers were elected: Honorary President—Dr. Alan Brown, Toronto; President—Dr. H. S. Little, London; Vice-President—Dr. George Campbell, Ottawa; Secretary-Treasurer—Dr. J. H. Ebbs, Toronto; Executive Committee—Dr. R. R. McGregor, Hamilton, Dr. Pearl Summerfeldt Rose, Evansville, Ind., Dr. W. L. McKenzie, Winchester, Mass., Dr. C. E. Snelling, Toronto; The Resident Physician, H.S.C.

It is planned that meetings be held annually at the hospital. Next year the new Hospital for Sick Children with its 632 beds, its laboratories and its greatly amplified facilities may be ready to receive the group.

Book Reviews

Cardiovascular Disease in General Practice. T. East, Physician and Physician-in-Charge of Cardiological Department, King's College Hospital. 208 pp., illust., 3rd ed. 15s. H. K. Lewis & Co. Ltd., London, 1949.

Although it is only three years since the 2nd edition of this handy text appeared, the rapid advances and changing concepts in the management of cardiovascular disease have necessitated extensive revision. The author has kept the volume abreast of the times without expanding the size of the book. In this way, although well up to date, the text remains suited to its task which is the brief presentation of sufficiently detailed material to be useful to the general practitioner. The subject matter is always to the point and practical. The author makes only the briefest reference to the more esoteric methods of cardiac investigation, placing all his emphasis on those signs and symptoms which the general physician can elicit at the bedside.

Common Procedures in the Practice of Pædiatrics. A. Brown, Physician-in-Chief, Hospital for Sick Children, Toronto; and F. F. Tisdall, late Physician, Hospital for Sick Children, Toronto. 308 pp., illust., 4th ed. $4.75. McClelland and Stewart, Ltd., Toronto, 1949.

This is the fourth edition of the well known volume on Common Procedures by Dr. Alan Brown, the Professor of Pædiatrics at the University of Toronto, and the late Dr. Frederick F. Tisdall, who was Associate Professor of Pædiatrics at the same university. The book contains a good deal of the material published in previous editions together with considerable new material. This new edition should serve the student, practitioner, and specialist, as well as it has in the past.

End

Continued on Page 46